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BUPHTHALMOS WITH FACIAL NAEVUS AND ALLIED CONDITIONS

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THE association of buphthalmos with facial naevus has received attention in ophthalmological literature from time to time over a period of many years, and a recent revival of interest in the subject has been stimulated by the appearance of articles by Cushing, Parkes Weber, Aynsley and others. About the time of the appearance of Aynsley's paper the following very early case came under my notice at the Glasgow Eye Infirmary.

Stanley C., aged three weeks, was brought to the out-patient department on January 3, 1930. His mother stated that the birth had been difficult—face presentation—but no instruments had been used. There had been no maternal injury during pregnancy. Two of the family of four are dead, but the family history throws no light on the present case. The father and mother have no blood-relationship. After birth it was noticed that there was swelling and red staining of the left side of the face. The eyelids were swollen and the eye bloodshot. It was thought that the redness was already fading and had disappeared from some parts, *e.g.*, beneath the chin. The right eye was found to be normal. The left cornea was relatively large (12·5 mm. diameter, right cornea 10 mm.) It was faintly opalescent and its surface steamy. There were no linear opacities. The anterior chamber was deep and the pupil small (1·5 mm.), the iris, flat, dark and featureless. The sclera was china-blue with a few dilated vessels. The tension to the finger seemed normal in both. A light port-wine staining of the skin occupied the left side of the head and face, mapping out fairly exactly the area of distribution of the first and second divisions of the fifth cranial nerve. The naevus involved the gum of the left upper jaw and there was another small isolated naevus in the left lower occipital region. No other congenital defects were found, but there was slight asymmetry of the facial bones in the form of relative prominence of the left superior alveolar ridge. After a few days' use of pilocarpine and dionine the corneal lustre

improved, but opalescence persisted. Under chloroform the tonometer measurements were: R. 25 mm. of mercury, L. 41·5 mm. of mercury (Schiötz). No ophthalmoscopic view could be obtained in the left eye and the right disc seemed doubtfully paler than normal. Radiograms of the skull showed no abnormality. At the age of five weeks Elliot's trephining was performed in the left eye and thereafter the corneal opacity gradually cleared. The cornea is now quite transparent and the normal lustre completely restored. The Schiötz tonometer, about two weeks after operation, gave the tension of the left eye as 16 mm. of mercury. At the age of six weeks the child was operated on for hernia. He is thriving well and the naevus, though no less extensive, is of a slightly paler colour.

This case does not differ materially from others which have been published, but it is probably the youngest which has been put on record, other early cases being those of Elschnig (nine weeks) Marchesani (four months) Nakamura (four months) and Galezowski (nine months). These cases present the simple association of facial naevus with buphthalmos, but a glance at the literature shows that there are many other conditions of an angiomatous nature more or less linked up with these and with each other and offering interesting problems in pathology.

It might be worth while to attempt a more complete review of these cases than is at present available.

Bibliography—Naevus and Buphthalmos

Our search takes us back to 1860 when Schirmer[1] described a case of capillary naevus affecting the skin of the face and trunk and the mucous membranes of the eye, nose, mouth and pharynx, associated with buphthalmos of the left eye. He noted marked

dilatation and tortuosity of the retinal veins but no choroidal abnormality.

After Schirmer's publication some nineteen years seem to have elapsed before the subject was referred to again. In 1879 Allan Sturge[2] presented to the Clinical Society a patient with a congenital port-wine mark on one side of the face and affected with epileptiform convulsions on the opposite side of the body, attributed by Sturge to a naevoid condition of the vessels of the brain. The eye on the same side as the facial naevus was described as having a large cornea and very myopic refraction. The choroid was darker than that of the opposite eye and the retinal vessels were tortuous. A few years later Horrocks[3] showed to the Ophthalmological Society a girl, 9 years of age, with naevus of the right side of the face including the eyelids, dilatation of the anterior ciliary veins, tortuous retinal veins and enlargement of the cornea in the same eye. Clonic convulsions and spastic hemiplegia were present on the opposite side of the body. The description of the eye condition in the cases of Sturge and Horrocks was incomplete, and leaves some doubt as to whether they are cases of true buphthalmos. The state of the ocular tension is not mentioned, but the abnormally large corneal diameter is at least suggestive of buphthalmos. These two cases were quoted by Stephen Mackenzie in the discussion on a case described before the Ophthalmological Society by Milles[4], in which an angioma of the choroid, demonstrated in the excised eye, had led to retinal detachment and blindness, and was accompanied by a naevus of the temporal and orbital regions on the same side. In Milles' case the tension of the eye was reported normal, but in other respects it closely resembles the case of Lawford[5], where, with a naevus of the left side of the face, there was a naevus of the choroid, sub-retinal haemorrhage, detachment of the retina and glaucoma, presumably secondary, in the left eye. Galezowski's case[6], published thirty-eight years after Schirmer's, was a typical congenital naevus of the face, with buphthalmos of the corresponding eye, and many other examples of the same combination have been recorded by Cushing[7], Elschnig[8,9], Marchesani[10] and others. Including my own case, described above, I find records of some thirty-one cases which should probably be placed in this category. These cases differ widely in their characters, *e.g.*, in Beltmann's[11], the naevus, though mainly in the distribution of the fifth nerve, affected both sides of the face and involved the mucous membranes of the nose, mouth and pharynx. The buphthalmos was bilateral. In Cabannes'[12] the naevus was cavernous rather than capillary and there was marked hypertrophy of the neighbouring bones and orbit. In Kaiser's [13] and in Marchesani's, the naevus, though predominating

on the side of the buphthalmic eye, affected the neck, limbs and trunk. Röttl's case[14] had homonymous hemianopia on the side opposite to the buphthalmos.

Naevus and Simple Glaucoma

Duschnitz's contribution in 1923 introduces a somewhat new aspect of the subject in that the eye condition in his case, although the patient was young, was no buphthalmos but simple glaucoma. In the same year further cases of naevus with simple glaucoma were reported by Salus[16], Safar[17] and Löwenstein[18], and others were published in more or less detail by Ginsburg[19], Derby[20], Hudelo[22], Suglian[23] and Krause[24]—some ten cases in all.

Naevus and Secondary Glaucoma

Although in some of these cases (Hudelo and Ginzburg) there were teleangiectases of the conjunctiva bulbi and other periocular structures, there was no intra-ocular angioma which could be held responsible for the rise of intra-ocular pressure. Such cases are sharply demarcated from a further group in which cutaneous naevus is associated with secondary glaucoma, in the more characteristic members of which there was a massive angioma of the choroid, with, or without, retinal detachment or haemorrhage, and the glaucoma could fairly be looked upon as an end result of these gross intra-ocular changes. Such were the cases of Lawford, already referred to, Snell[25], Steffens[26], de Haas[27] and Wagenmann[28]. Somewhat different was that of Bär[29] in which ophthalmoscopic examination showed, in addition to glaucomatous cupping of the disc, dark tortuous retinal veins, anastomosis of veins and a grey sharply-defined patch in the retina associated with fine venous twigs. Bär conceived that this fundus patch represented an old haemorrhage. Krause's first case had varicose vessels in the iris and conjunctiva bulbi and enormous enlargement of the choroidal vessels in the periphery of the fundus. In Knapp's case[30] a number of grey nodules were seen scattered over the iris which, on microscopic examination, showed thickening of the iris stroma with enlarged thin-walled vessels. In Knapp's view the glaucoma here was explained by the presence of these changes in the peripheral zone of the iris, leading to obstruction at the angle of the anterior chamber.

More nearly approaching to the simple glaucoma group is the case of Yamanaka[31] in which the secondary character of the glaucoma was suggested only by the presence of wide and tortuous retinal veins round the optic disc. A somewhat similar state of the retinal veins, without any visible evidence of involvement of

the choroidal vessels, was referred to in the buphthalmos cases of Schirmer, Beltmann and Aynsley[32] and in the pseudo-glaucoma case of Voegele[33]. The presence of these abnormalities of the retinal vessels has led Elschnig and others to assume the existence of a corresponding abnormality of the choroidal vessels and to seek an explanation of the glaucoma in the vascular dilatation and " plethora " in the choroid.

Those cases in which we find varying degrees of abnormality of the retinal arteries, and especially the case of Bär, may be related to the condition known as v. Hippel's disease, or angiomatosis retinae, many cases of which are now on record, and an excellent illustration of which is given by G. H. Pooley[34] in the *Transactions of the Ophthalmological Society*. Interest in this condition has been increased by the more recent work of Lindau[35], who has found the characteristic retinal vascular changes associated with capillary angiomata and hemangiomatous cysts in the brain, spinal cord, liver, pancreas and kidney. The initial lesions here are supposed to be congenital. Thus Lindau's cases are linked up, on the one hand through angiomatosis retinae and on the other through congenital vascular disease of the central nervous system, with the cases with which we are here concerned, and this association is further strengthened by the case, mentioned by Collins[36], of angiomatosis retinae associated with small angiomata in the skin of the eyelid. It is to be noted also that eyes affected with v. Hippel's disease frequently succumb to secondary glaucoma.

Naevus and Pseudo-glaucoma

In 1925 Voegele[33] described a case of a man, aged 62 years, with a capillary naevus of the right side of the face; with excessive vascularity of the conjunctiva, sclera and episclera of the right eye, glaucomatous excavation of the papilla, slight varicosity of the retinal veins and a very slightly increased corneal diameter; while the anterior chamber, the tension, field of vision and visual acuity were all normal. We are probably justified in describing this as a case of " pseudo-glaucoma," and thus grouping it with the cases reported by Macrae[37] and Thomson[38] in this journal some four years later. It is true that these three cases were not similar in their clinical characters, but they had as a common feature the absence from the affected eye of hypertension and other characters necessary for the diagnosis of glaucoma or buphthalmos. The condition of the optic disc in these cases was probably a congenital deformity, and Voegele's case was unique in that the visual acuity and field of vision were unaffected. In the patient described by Thomson the affected eye was myopic while the normal eye was slightly hypermetropic. In this

connection I might refer to a further case which recently came under my notice.

The patient was a man, aged 29 years, with a patchy capillary naevus of the left lower eyelid, cheek, nose and upper lip, the left eye having myopia of 5D. with myopic astigmatism of 1·5D. and a Fuchs coloboma of the lower segment of the disc. The corneal diameter, the colour of the iris, size of the pupil and depth of the anterior chamber were the same as those of the right eye and there was no glaucomatous cupping. The bones of the left side of the face were slightly larger than those of the right side.

In this case the myopia and the coloboma of the disc are probably congenital anomalies analagous to the myopia and the deformity of the disc in Thomson's case.

Naevus and Cerebral Disease

In Macrae's case the arm and hand on the side opposite to the affected eye were abnormally small, and in Thomson's case there was a history of paralytic attacks affecting the arm and leg on the side opposite to the affected eye. This brings us to the consideration of a very important group of cases which present, in addition to naevus of the skin and glaucomatous or other allied changes in the eye, signs and symptoms of intracranial disease, generally of the nature of a meningeal angioma. The earliest example of this combination to which I can find any reference is the case of Sturge[2], which was afterwards quoted by Mackenzie[39] and is frequently referred to as Mackenzie's case. This patient had a port-wine stain on one side of the face, tortuous retinal vessels and choroidal changes on the same side, and the affected eye was very myopic and had a large cornea. Epileptiform seizures had occurred on the opposite side of the body, and Sturge attributed these to a naevoid condition of the vessels of the brain similar to that of the face and eye. Mackenzie, in the same connection, quoted the case of Horrocks[3] which presented a naevoid condition of the face and eyelids, dilated anterior ciliary and retinal veins and a large cornea, and suffered from spastic hemiplegia on the opposite side of the body. Horrocks pointed out that the affected vessels belonged to parts derived from epiblast and suggested that the vessels of the pia mater might be similarly affected. These shrewd suggestions of Sturge and Horrocks were justified and confirmed in two of the three cases reported by Cushing more than twenty years later, in one of which, at necropsy, and in the other, in the course of operation, the suspected naevoid condition of the meninges was found. The clinical diagnosis of this group of cases was carried a stage further by Parkes Weber[40]. His case was first reported in 1922—a female, aged 28 years, with widespread congenital naevus of the face, chest, arms, back, etc., right sided spastic hemiplegia, relatively poor development of the right face and limbs, and left sided buphthalmos. In addition, there was a condition of dystrophia adiposo-genitalis. A diagnosis of

vascular naevus of the meninges on the left side was made, and in 1928 it was possible to demonstrate, by radiograms of the skull, the presence of a calcified meningeal angioma in that situation.

In most cases of this group the clinical evidence of intracranial involvement takes the form of unilateral spastic hemiplegia or epileptiform convulsions, and a degree of mental defect is common. In some cases (Parkes Weber, Macrae) the limbs on the side opposite to the affected eye were smaller. Aynsley's paper[32] gave special attention to this association of cerebral lesions with naevus and with buphthalmos and other eye conditions. He refers to 13 such cases, and to these I am able to add the cases of Sturge and Horrocks, already referred to, and the cases of Hudelo, Voegele, Ginsburg and Röttl. Hudelo's and Ginzburg's patients suffered from simple glaucoma, but in all the other cases the eye condition was buphthalmos. In eight of the 19 cases in this list radiograms demonstrated the presence of a naevus of the cerebral meninges, while in two this was proved by operation or at necropsy. It may be presumed that in some, at least, of the others a meningeal angioma was present, in which calcification had not yet occurred and therefore gave no evidence in the radiograms. A case which has special interest for the ophthalmic surgeon was that in which the association of facial naevus with a contralateral homonymous hemianopia enabled Foster Moore[41] to suggest that the latter might be caused by a meningeal angioma, and the diagnosis was subsequently justified by the radiograms. This case is, however, not unique, as in an earlier case of Röttl's, which presented facial naevus, buphthalmos and homonymous hemianopia, there was X-ray evidence of an angioma of the meninges in the occipital region. In Foster Moore's case buphthalmos was not present, but there were congenital abnormalities in the form of slight dislocation of the lenses and a small coloboma of the left disc.

I have included in this group two cases which differ materially from the others in that the intracranial disease is apparently not vascular in its nature. These are the cases of Voegele, combining facial naevus and pseudo-glaucoma with dystrophia adiposogenitalis, and of Ginzburg, with facial naevus, glaucoma simplex and acromegaly. In Parkes Weber's case, too, while facial naevus and buphthalmos were associated with spastic hemiplegia due to meningeal angioma there was evidence of pituitary disease in the form of obesity, defective sexual development and a small pituitary fossa. The significance of the pituitary disease in these cases is obscure and in the absence of any record of post-mortem investigation one can only speculate as to the nature of the intracranial lesion. The number of cases is so small that the association of pituitary involvement with naevus and glaucoma

might be purely accidental, but, as we shall see, radiological evidence of enlarged sella turcica has been found in cases of buphthalmos associated with neuro-fibromatosis, and in one such case (Vogt) there was acromegaly affecting the face and limbs on one side. It is difficult to resist the belief that in such cases there exists a vascular or nervous lesion which is interfering with the pituitary body.

Detachment of the retina has formed a feature of some naevus cases in which angioma of the choroid led to secondary glaucoma (Lawford, Snell, Steffens, Paton and Collins[42]), but it has also been found in some cases without glaucoma. Thus Onken[43] reports a case of unilateral naevus of the face with double detachment of the retina. There was no ophthalmoscopic evidence of choroidal angioma, but he quotes a case of Salus with angioma of the choroid, retinal detachment and no glaucoma, and a similar case was reported by Milles. A case which has recently come under my notice may belong to this group. This young woman has a capillary naevus of the face and eyelids, varicosities of epibulbar vessels, complete cataract and divergent squint, all affecting the right side. The light projection tests make it probable that a detachment of the retina is present, and one might almost assume the presence of a vascular choroidal lesion.

Other cases which have some affinity with these we are considering are those of facial naevus with retinal vessel changes, but not buphthalmos or glaucoma (Hartridge[44] and Work Dodd[45]) and others with angioma of the choroid leading to glaucoma, but without facial naevus.

Buphthalmos with Neuro-fibroma

This sketch of the groups of cases relating themselves to facial naevus and buphthalmos would be incomplete without reference to another large group in which buphthalmos or glaucoma has been found associated with neuro-fibroma or plexiform neuroma of the face, eyelids or orbit on the same side. The first case of this kind seems to have been reported by Schiess-Gemuseus[46] in 1884. In 1903 Snell[47] reported three cases of plexiform neuroma involving the eyelids and orbit of one side, and in one of these cases buphthalmos was present on the same side. Histological examination by E. T. Collins demonstrated the presence of the neuro-fibromatous change in the ciliary nerves. Discussing this case Verhoeff[48] of Boston referred to a similar case in his own experience. Snell did not see any causal connection between the two conditions and thought that the buphthalmos was explained by abnormality of the angle of the anterior chamber, but Verhoeff pointed to the involvement of the nerves and the eye on the same side and thought the abnormality of the ciliary nerves might have

brought about the buphthalmos by disturbing the nutrition of the eye. It would probably be more correct to assume, as in cases of buphthalmos with naevus of the skin, that some embryonic fault was the starting point, both of the neuro-fibroma and of the buphthalmos. It is noteworthy that in some of these cases (Snell) the eye presented other congenital abnormalities, such as absence of part of the zonule, malformation of the lens and coloboma of the iris. Other English references to cases of this group will be found in the *Transactions of the Ophthalmological Society* in contributions by Collins and Batten[49] and by Sutherland and Mayou[50]. A further interesting parallelism between buphthalmos with neuro-fibromatosis and buphthalmos with capillary angioma is illustrated by cases reported by Vogt[51] and Mintschewa[52], in which there was radiological evidence of enlargement of the sella turcica, while in Vogt's case there was acromegaly affecting the arm and leg as well as the facial bones on the same side as that of the buphthalmos and neuro-fibroma. The appended list of cases of buphthalmos with neuro-fibroma is largely taken from Mintshewa's paper and is probably incomplete.

Discussion

Considerable interest attaches to the question of the aetiological connection, if any, between buphthalmos or glaucoma on the one hand, and on the other hand the vascular or nervous lesions shown to occur in the brain and meninges, in the mucous membranes, skin and subcutaneous tissues, bones of the skull, pituitary gland and even the viscera. When one considers the variety of associated lesions and the many different combinations in which they may occur, it is evident that a theory which might fit one or two cases may fail when it has to be applied to the whole group, and it cannot be pretended that any satisfactory explanation of the origin of these anomalies has been offered. Some authors have hoped to find in them a guide to the pathogenesis of glaucoma in general. In the examples of choroidal angioma with secondary glaucoma, such as that of Lawford, we may presume that mechanical factors, similar to those operative in any case of intra-ocular neoplasm, may have brought about the rise of tension; but the sequence of events is not so clear in the cases of buphthalmos and simple glaucoma. In some instances no vascular anomaly, extra- or intra-ocular, has been discovered; in some there has been no more than a minimal hyperaemia of the episcleral vessels, and in others, as in Schirmer's original case, merely some dilatation and tortuosity of the retinal veins. No one has suggested that these slight vascular changes are in themselves causes of buphthalmos

or glaucoma, but between these and cases like Lawford's, Snell's and Steffens' varying degrees of angiomatosis, both intra-ocular and epibulbar, have been observed. This has led to the advancement of two *vascular* theories to account for the glaucoma; one, accepted in more or less similar form by Beltmann, Elschnig, Ginzburg, Clausen[53], Nakamura[54], Yamanaka, Bär and Krause, which assumes an increased number and size of the choroidal veins leading, through "plethora" in the choroid, to increased transudation and diminished outflow of intra-ocular fluids, and thus to elevation of intra-ocular pressure; and the theory of Hudelo who postulates the existence of an angiomatous lesion impeding the evacuation of the cavernous sinuses, delaying venous circulation in the choroid and causing accumulation of CO_2 in the uveal blood stream. It is difficult to accept either of these explanations as valid for the cases of simple buphthalmos and still more so for cases of pseudo-glaucoma, like Thomson's and Macrae's. Ginzburg explains that the angiomatous conditions are congenital and in some cases operate early so as to produce buphthalmos, while in others the congenital disposition to glaucoma remains latent and only manifests itself later, owing to some senile vascular change or increase of intra-ocular teleangiectasis which upsets the balance and allows elevation of intra-ocular pressure. Hudelo also argues that the angiomatous lesion may take on growth in adult life and thus cause the development of glaucoma instead of buphthalmos, but these suggestions are not very helpful. Cabannes' case was somewhat peculiar, in that, in association with an extensive subcutaneous angioma in the temporal fossa and neighbouring region there was enormous hypertrophy of the same side of face, tongue, facial bones and orbit, while the enormous buphthalmic eye had neither high tension, glaucomatous cupping nor obstruction of the canal of Schlemm and spaces of Fontana. Discussing his case, Cabannes points out that hypertrophy of tissues and organs in the neighbourhood of angiomata is a well-known fact and argues that the buphthalmos is a congenital hypertrophy due to over-nutrition from the proximity of the naevus. It is true, that hypertrophy of soft tissues, and even of bones, in the neighbourhood of the angioma is illustrated in some of the cases under review, and the hypernutrition assumed by Cabannes, might be applicable in some of these; but in many cases there is no evidence of an angiomatous condition in the vascular system of the eye, and, in any case, hypertrophy due to hypernutrition would not explain the many other cases of buphthalmos with tension, glaucoma simplex and pseudo-glaucoma.

The frequency with which cutaneous naevus follows the distribution of the 5th cranial and other nerves has led to the

suggestion of its nervous origin, and attempts have also been made to explain glaucoma on nervous grounds, but no satisfactory *nervous* theory has been proposed to account for the simultaneous occurrence of these and the other abnormalities under discussion.

Endocrine disturbances have also been invoked to explain the origin of glaucoma, and Ginzburg draws attention to this in considering cases like his own in which glaucoma and naevus were associated with evidence of pituitary disease, and the case of Vogt of neuro-fibromatosis and acromegaly. Nothing, however, has been adduced to show how a primary pituitary fault could bring about the large variety of lesions found in the cases under consideration, and it seems at least equally probable that disturbance in the region of the sella turcica is the result, rather than the cause, of an angiomatous or neuro-fibromatous change.

At least a passing reference should be made to the possibility of a *traumatic* origin for some of these cases. In Macrae's case of naevus with pseudo-glaucoma there was a history of maternal injury in the seventh month of pregnancy. In Thomson's somewhat similar case there was a difficult instrumental delivery and the child was born with great swelling of the right side of the face and some bruising above the right eye, from which the naevus seemed to develop and spread. In a case of naevus and hemiplegia (Cockayne, quoted by Brushfield and Wyatt[55]) the mother attributed the trouble to the fact that during the third month of pregnancy she had seen a cripple with a large birth-mark. In the case which I have described at the outset of this paper there was a history of facial presentation with difficult, but not instrumental, delivery, and the swelling and redness of the left side of the face and the abnormality of the left eye were all attributed to the abnormal delivery. Indeed the steamy opalescent appearance of the cornea when first seen was not unlike the first stage of a birth injury of the cornea. It must be admitted, however, that these cases are few and exceptional and their history scarcely justifies the serious suggestion that trauma played a part in their causation. Birth injury could not, for instance, account for a fully developed buphthalmos or congenital malformation of the disc.

Of the theories offered to explain the association of buphthalmos or glaucoma with the various angiomatous lesions described, the vascular theory has most to commend it, but it seems impossible to establish a causal relationship between the cutaneous or meningeal naevus and the ocular condition. At the most we can say that when angioma affects the choroid this leads to secondary glaucoma, and that a less obvious vascular lesion in the choroid may be present in cases described as glaucoma simplex, but an explanation which will embrace the cases of buphthalmos (with

widely differing clinical and microscopical characters) of pseudo-glaucomatous malformation of the disc and other congenital anomalies of the eye must assume a common initial lesion at a very early embryonic date.

Although vascular disturbances predominate we have to take account of congenital deformities, such as colobomata of the optic nerve, choroid, iris and zonule, polydactyly, cleft palate, hypotrophy and hypertrophy of bone and soft tissues, which may form part of the abnormal picture in different cases, and we cannot omit from consideration those cases in which buphthalmos and glaucoma are associated with neuro-fibromatosis rather than with vascular naevus.

Safar[17] and Marchesani[10] are among those who deny a causal connection between the associated lesions and see in them a group of co-existent congenital anomalies due to a defect in the germinal layers. When we consider the very wide diversity in the structures involved and in the extent and profundity of the changes produced it is necessary to assume an origin very early in embryonic life.

Whatever the cause may be which produces the cutaneous, meningeal or intra-ocular angiomata, or, it should be added, the neuro-fibromata found in other cases, the same cause affects the mesoblastic tissues of the eye, in some cases in such a way as to produce buphthalmos, in some, other congenital anomalies, in other cases giving rise to invisible structural changes which predispose to the occurrence of glaucoma in later life. A view somewhat similar to this is expressed by Aynsley, but this author, being impressed with the association of the intra-cranial and ocular lesions, suggests that when the initial cause " acts to produce naevi of the cerebral vessels *then* the mesoblastic structures of the developing eye may be affected " and " that it is probably in the cases where there *is* intracranial involvement that eye defects are likely to arise." But it must be remembered that many cases are on record (for bibliography see Parkes Weber[40]) in which cutaneous and meningeal naevus co-existed without any ocular abnormality, and on the other hand cases have been reported in which there was buphthalmos, or other eye condition, with cutaneous naevus but no evidence of intracranial disease. It therefore seems unjustifiable to relate buphthalmos and meningeal angioma so closely to each other as Aynsley has done.

The distribution of the cutaneous naevus in the area of the 5th cranial nerve in many of these cases has naturally attracted some attention and has lent support to the view that some nervous factor accounts for the naevus and for the accompanying ocular lesion. As Cushing has pointed out also the meninges which may be involved in the angiomatous change are innervated largely by the

trigeminal nerve. Another interesting illustration of this association of the meninges and skin is provided by the case reported by Stanley Cobb[57] in which there was haemangioma of the spinal meninges and naevus of the skin of the same metamere. It is true that in some cases, as in my own case described at the beginning of this paper, the naevus and buphthalmos are unilateral and the naevus confined in a fairly exact manner to the area of distribution of the first two divisions of the 5th nerve, but in some cases we can only speak of a predominance of the naevus on the side of the buphthalmic eye, and in others the naevus has a very wide distributon on both sides of the face and even on the trunk and limbs. Here again, if we tried to bring all these cases into one category and to find the causal factor common to them all, we should be compelled to trace back the cutaneous, meningeal and ocular changes to a common origin, and to assume that while in some cases the initial disturbance may be more or less extensive, it may in others confine itself pretty strictly to one or more of the embryonic metameres.

The point of practical importance which emerges from a consideration of these cases, and to which attention has been directed by several authors, is that the presence of a cutaneous naevus, with or without buphthalmos or glaucoma, may give a valuable clue to the nature of a co-existent intracranial lesion. This was suggested by Allan Sturge as far back as 1879 and by Horrocks in 1883 and was confirmed by operation or by postmortem examination in Cushing's cases and by the radiological findings in the cases reported by Brushfield and Wyatt, Röttl, Foster Moore, Parkes Weber and Aynsley.

Cases of Naevus with Buphthalmos

Schirmer (1860), Sturge (1879), Horrocks (1883), Galezowski (1898), Beltmann (1904), Cushing, three cases (1906), Cuperus (1909), Cabannes (1909), Elschnig (1918), Freese (1920), Elschnig (1922), Nakamura (1922), Zaun (1924), Marchesani (1925), Kiranoff (1925), Vita (1925), Kaiser (1927), Brushfield and Wyatt, two cases (1927 and 1928), Röttl (1928), Aynsley, two cases (1928), Voegele (1928), Clausen (1928), Parkes Weber (1929), Safar (1929), Krause (1929).

Cases of Naevus with Glaucoma Simplex

Duschnitz (1923), Salus, two cases (1923), Safar (1923), Löwenstein (1923), Ginzburg (1926), Derby, Waite and Kirke (1927), Hartmann (1929), Hudelo (1929), Suglian (1929), Krause (1929).

Cases of Naevus with Secondary Glaucoma

Lawford (1885), Snell (1886), Wagenmann (1900), Steffens (1902), Paton and Collins (1919), Bär (1925), Yamanaka (1927), Knapp (1927), de Haas (1928).

Cases of Naevus with Pseudo-glaucoma

Voegele (1925), Macrae (1929), Thomson (1929).

Cases of Naevus, Buphthalmos (or Glaucoma) and Intracranial Disease

Sturge (1879), Horrocks (1883), Cushing three cases (1906), Voegele (1925), Ginzburg (1926), Brushfield and Wyatt, two cases (1927 and 1928), Röttl (1928), Macrae (1929), Thomson (1929), Foster Moore (1929), Parkes Weber (1929), Aynsley, two cases (1929), Hudelo (1929), Krause (1929).

Cases of Buphthalmos (or Glaucoma) with Neurofibroma

Schiess-Gemuseus (1884), Sachsalber (1889), Lezius (1889), Sachsalber (1898), Snell and Collins (1903), Verhoeff (1903), Collins and Batten (1905), Michaelson-Rabinowitsch (1906), Rosenmeyer (1906), Sutherland and Mayou (1907), Michael (1908), Komoto (1909), Murakmi (1913), Vogt (1924), Mintschewa (1926).

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TWO CASES OF EPITHELIAL IMPLANTATION CYST OF THE IRIS

BY

R. FOSTER MOORE

LONDON

THE following are two cases of epithelial implantation cyst on the iris which have come under my care and upon which I have operated.

The first case has already been reported for me in its earlier stages by Mr. R. C. Davenport in the *St. Bartholomew's Reports*, 1924, Vol. LVII. p. 141. It may now be considered to be complete and so is worth reporting fully.

On May 17, 1922, a house surgeon wearing concave glasses was playing fives when the ball came back and broke the spectacle glass into his right eye. He was at once admitted into the hospital and I saw him the same evening. There was a clean linear wound through the whole thickness of the cornea extending completely from one side to the other, from about 10 o'clock to 4 o'clock and cutting across the middle of the cornea. The anterior chamber had already partly reformed, there was no prolapse of the iris, the pupil was circular, the lens had escaped damage and it was clear that no operative procedure was desirable.

Next morning the fundus was clearly seen and was normal, the eye was soft and on the front of the iris at about 4 o'clock at the site at which the cyst afterwards formed, was a small greyish white, rather woolly-looking mass. Examination both by X-rays and by the giant magnet gave a negative result, and transillumination of the globe produced no information.

The eye quickly healed and soon was nearly white. Sixteen days later the small mass on the front of the iris, already referred to, was smaller but was still clearly visible. A fortnight later a few very fine keratic deposits were present and the small mass on the iris could no longer be seen.

From this time the eye gradually settled down, the acuity with myopic correction became a complete 6/6, but the eye was still for many weeks a little softer than the other one and was inclined to flush rather easily on examination. I many times expressed the feeling that there must be something, perhaps of the nature of some impalpable dirt carried in at the time of the accident that was irritating the eye and that was responsible for the softness, slight as it was, and the tendency to flush.

Ten months later the patient himself noticed a change in the eye. At the inner end of the wound behind the nasal end of the scar was a small spherical pearly cyst, and lying across it with its

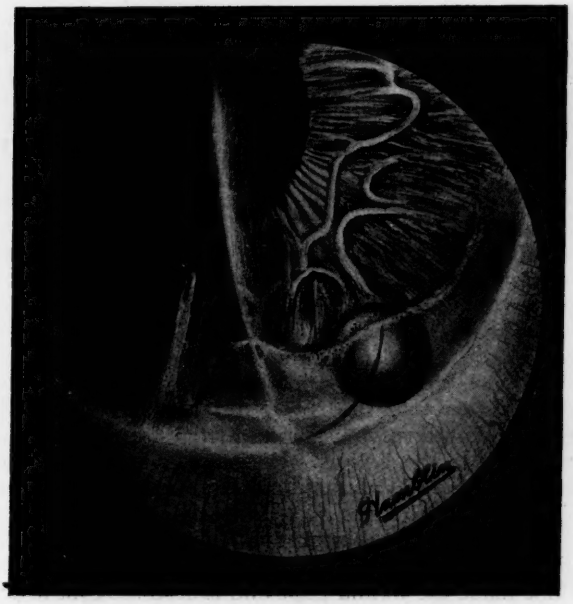


PLATE 1.

root uppermost was an eyelash. It now seemed clear that this lash, owing to its curve, had lain completely hidden in the angle of the anterior chamber and that its presence was responsible for the slight softness of the eye and its irritability in the earlier stages; the growth of the cyst had pushed the lash forward and so brought it into view.

The cyst increased in size under observation, it was decided therefore to remove it. On July 27, 1923, that is 14 months after the original injury, a section was made with a keratome at the corneo-scleral junction at 5 o'clock, the lash was removed by means of an iris hook; it came out entirely free and was quite unattached to the cyst. The wound was now enlarged by a narrow von Graefe's knife, an iridectomy so planned as to include the cyst was then performed and the eye closed down. Sections of the cyst showed it was lined by squamous epithelium and was similar in all essentials to the cyst in Case II, Figs. 1 and 2.

Seeing that the lash had lain incubating, so to speak, in the anterior chamber for so long as 14 months, one wondered whether it would show evidence of growth. It was examined for me by Dr. R. G. Canti with respect to this point and he was unable to find any evidence that growth of it or of its root had occurred. Healing was uneventful, and full vision was again obtained.

Five months later, that is in January, 1924, a year and eight months after the accident a little discomfort was again felt and a small cyst precisely similar to the former one and having exactly the appearance of a pearl, both in shape and sheen was seen far back in the angle of the anterior chamber; it was situated exactly in the coloboma as if in connection with the cut root of the iris, or ciliary body. It was small and by means of the slit-lamp it could be seen that its posterior surface was flattened by contact with the edge of the lens.

At this time Mr. J. H. Fisher was good enough to see him with me and it was agreed that removal was necessary. It was quite clear at the same time that being so far back it would be a matter of some delicacy to remove it. Operation was delayed for a fortnight as staphylococcus aureus was found to be present and during this fortnight the cyst increased in size. On February 26, 1924, a general anaesthetic was administered by Dr. C. F. Hadfield, a wide flap of conjunctiva was raised from the nasal side and was dissected back to the limbus. A section was now made behind this flap with a small cataract knife and an endeavour was made to avoid transfixion of the cyst on passing the knife across the anterior chamber by working round it on its nasal side.

Having completed the section the conjunctival flap was pulled upon; this made the wound gape and caused the cyst to present in the wound. It was then dissected round by means of an iris repositor and although it was ruptured during this manoeuvre it was completely removed. The ciliary processes were clearly exposed during the operation. The eye made a complete and uneventful recovery and now, April, 1930—that is seven years and eleven months after the accident his visual acuity is better than 6/6 and the eye causes no trouble.

Case II

On December 11, 1929, a woman aged 48 years, was breaking some coal with a coal-hammer when something flew into her right eye. Five days later she noticed a spot in the eye and it became a little bloodshot and ten days after the accident she consulted me at the Moorfields Eye Hospital.

The scar of a perforating wound of the cornea was present, adjoining the limbus at 6 o'clock. A small whitish mass was visible on the front of the iris rather to the nasal side of the wound. The eye was little inflamed, the fundus appeared normal and the visual acuity was 6/9. The left eye was normal and healthy. Examination by the giant magnet was negative. On December 21, Mr. Bruce Hamilton, Senior House Surgeon to the hospital, made a keratome section below and removed the foreign body with iris forceps. It proved to be a small fragment of coal

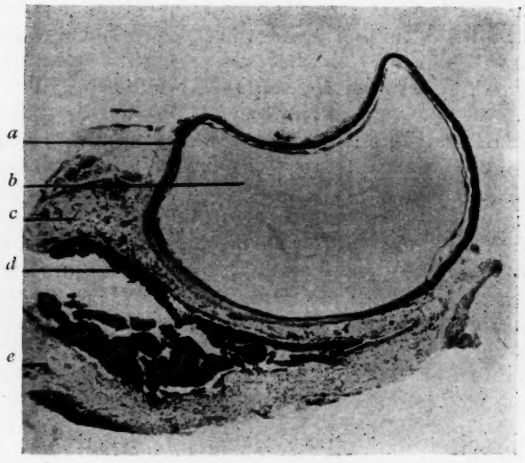


FIG. 1.

IMPLANTATION CYST OF IRIS. Low power view.

a Cyst wall. *b* Keratinized contents of the cyst. *c* Iris stroma. *d* Pars iridica retinae. *e* Remainder of the iris folded back upon itself.

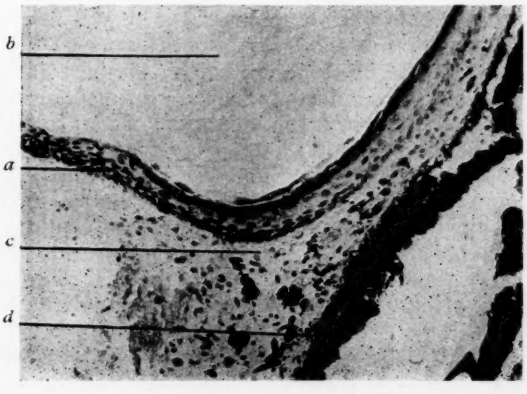


FIG. 2.

IMPLANTATION CYST OF IRIS. High power.

a Cyst wall. *b* Keratinized cyst contents. *c* Iris stroma. *d* Pars iridica retinae.

surrounded by exudate. The eye healed satisfactorily and the patient was discharged from hospital on January 4. A small woolly spot on the iris had been noticed by Mr. Hamilton before her discharge. On May 22 she was readmitted because she had noticed a white spot in her eye ten days previously. The eye was quite white, there were no keratic deposits. On the iris could be seen a small pearl-like epithelial cyst in appearance precisely similar to those in the previous case, and lying across it was a small eyelash (Plate 1). On May 24 a flap of conjunctiva was turned back towards the limbus as in the previous case, a section of the cornea was made with a small cataract knife and using the conjunctival flap as a sort of handle, it was pulled upon as in Case I and this caused the wound to gape and the cyst to prolapse quite cleanly outside the eyeball. It was cut off and again the eye healed without trouble. The patient left the hospital on June 3 with the eye white, the iris free of the wound, no keratic deposits and a visual acuity of a complete 6/6 unaided. During the manipulation the small eyelash was lost sight of but I think it probable that it was washed out of the anterior chamber with the escape of the aqueous; it was certainly not attached in any way to the cyst.

Mr. H. B. Stallard was good enough to prepare sections for me and has supplied the following report:—

"The specimen was fixed in Zenker's solution, embedded in paraffin, and serial sections were cut and stained with haematoxylin and eosin.

"There is a cyst embedded in the iris. It projects forwards above the level of the anterior surface of the iris and backwards into the stroma, where at one point the cyst wall is close to the posterior limiting membrane. Fig. 1.

"The cyst is ovoid in shape, except for the indentation on the anterior surface, an artefact produced during hardening and section-cutting. The cyst wall is composed of four to six layers of stratified epithelial cells and of these the innermost two or three layers have become degenerate and keratinized. (Fig. 2). The cyst contains kerato-hyaline, an opaque, horny, structureless substance which stains pink with eosin. The continuity of the anterior endothelial layer of the iris is interrupted at the place where the cyst projects above the level of the iris. The iris stroma in the vicinity of the cyst shows some condensation of its connective tissue.

"The pathological diagnosis is an implantation epithelial cyst of the iris."

The points of particular interest in these cases seem to be as follows:—In Case I it was remarkable that a clean penetrating cut should be made completely from one side of the cornea to the other without damaging the iris or the lens or without the iris

becoming in any way adherent to the wound. The slight irritability and lowered tension of the eye made it seem certain that some foreign body had been carried into the eye, although no sign of it was discoverable after repeated examination, and it was only months afterwards when the cyst appeared pushing forward the eyelash that this judgment was justified. The lash was quite unattached to the cyst and the same was true of the second case, nor did it show any signs of growth although it had, so to speak, been incubated for several months. The method of exposure gave excellent results, it allowed one to get far back in the anterior chamber, especially in the instance of the second cyst in Case I and the slight distortion of the globe and gaping of the wound which could be produced by pulling on the conjunctiva using it as a handle caused the cysts to protrude prominently from the wound so that they were easily removed. The second cyst in Case I was placed so far back that the ciliary processes were clearly seen during operation and the cyst itself was flattened by contact with the edge of the lens. During the removal of this, its walls were lacerated and its contents escaped in part into the anterior chamber. Having regard to the nature of the contents, one would not expect any particular trouble from it nor has any arisen for so long a period of six years. Whether implantation cysts of this nature ever occur apart from the inclusion of an eyelash, I do not know but if so, they must be exceedingly rare.

There is one other point of possible interest, that in each case a small woolly-looking fragment was noticed on the front of the iris which afterwards seemed to disappear, as if in some way it were a precursor of the development of the cyst.

THE NON-MAGNETISABLE METALLIC FOREIGN BODIES OF THE CORNEA, WITH THE REPORT OF A CASE

BY

B. W. RYCROFT

BRADFORD

METALLIC foreign bodies of the cornea may be arbitrarily divided into two classes based on their magnetic properties and it is with the non-magnetic and more uncommon type that I wish to deal, for the treatment of cases in this class may be relatively simple or extremely difficult.

Representative metals of this class are brass, copper, lead, solder and gold; all of these are found as foreign bodies on the cornea,

and, in addition to their chemical composition, their propelling force and the form in which they reach the eye have an influence on the progress and prognosis of their respective cases.

Brass often occurs as a " turning " which is shaved off the rough metal whilst it is being spun on the lathe, and consequently, it has a spiral shape and is extremely sharp. The propulsive power, however, is tangential and not very great so that it is usual to find part of the foreign body free, which renders the removal of it from the cornea a simple matter.

Copper may be said to occur in two forms, namely as from a percussion cap and as metallic particles rubbed off an overhead electric wire by the passage of a trolley pole over a junction. In the former instance, the fragment enters the eye with great force and the features of a penetrating injury dominate the case, but, in the latter instance, it is the cornea which is chiefly involved. Wurdemann[1] mentions the intense photophobia which is caused by these pieces of copper oxide, and Maitland Ramsay[2] quotes Leber as having drawn attention to the marked reaction which follows the presence of copper, even when free of organisms. Rust[3] has collected twenty-six cases of such corneal injuries by copper and states that twenty-five arose from overhead wires, and one from a travelling crane.

Lead may reach the eye as lead shot or as a splash of molten metal and it is the latter form which chiefly affects the cornea.

In such cases, the large size of the foreign body and the weight of the metal reduce the penetrative force so that it is unusual to find primary penetration of the globe, although secondary perforation by corneal necrosis occurs. Ball[4] has reported a case in which a lead cast of the cornea and inferior conjunctival fornix was removed from a patient four days after it had been received, and Wurdemann[5] has described the case of a marker on a military range who had had removed from his cornea particles of lead which had ricochetted from the target after the bullet had hit it. In neither case was the cornea directly perforated.

Solder falls into a different category since it possesses a property of adherence not present, to any great degree, in the other metals, and it is this same physical property which may occasion peculiar difficulties in treatment.

It arrives at the eye in the shape of a single globule, when it pursues a course similar to that of lead, or as minute particles which are sprayed on to the cornea and which not only embed themselves, but make a firm union with the tissue and one which is very difficult to sever. Common solder is a mixture of lead and tin in varying proportions according to the adhesiveness required; it has a low melting point and " balls " of it readily burst. The better type of solder is the silver solder, which is more stable and

does not tend to spray under high temperatures; it is met with under experimental conditions.

As a foreign body, the occurrence of gold is exceedingly rare but Wurdemann[6] has met with such a case in a lady who, two weeks after having had her teeth filled, came to him for the removal of a fine piece of the metal impacted in the cornea.

The treatment of these various foreign bodies finally depends on the condition in which they exist in the cornea, namely single or multiple. It may be:

1. Removal by needle or spud when the foreign body is of suitable size.

2. Removal by anticipation of secondary ulceration, when the particles are in a minute state of sub-division. This is particularly applicable to multiple foreign bodies but does not always occur.

3. Removal by burning them out with the galvano-cautery as mentioned by Wood[7]; the final result on the vision is not always satisfactory with this method.

4. Curettage of the corneal epithelium was introduced primarily for the treatment of lead incrustations and may be applied to the multiple foreign bodies, provided they are not too deeply situated in the cornea.

5. Removal may be impossible and, if chemically indifferent, such as lead, they may be tolerated and retained in the cornea. (Fuchs[8]).

6. Suction has been employed by Israel[9] using a small water suction cylinder, and he states that " practically all characters and kinds of foreign bodies have been removed by this method." The author has recently conducted similar experiments using a reversed blow-pipe vacuum but up to now the results have not been quite so satisfactory.

7. Corneal section may have to be employed as a last resort, and at the Mayo Clinic, Benedict[10] dissected off a " quadrilateral section of the cornea, taking all but a narrow zone above and below, down to Descemet's membrane." This occurred in the case of an engineer who received multiple corneal foreign bodies as the result of the explosion of a gasoline still. The final visual acuity was 6/30 and the " cornea was now slightly hazy in the central portion." An interesting feature of this case was that after seven months of intense irritation, the particles had not nearly been exfoliated.

The following case will illustrate a few points in connection with multiple foreign bodies of the cornea due to solder.

E. S., an experimental engineer, was conducting an experiment on a copper ball, which was thought to be silver-soldered and therefore capable of withstanding a steam pressure of about 500 lbs.

per square inch. At 10 lbs. pressure, the ball burst and the solder was sprayed on to the patient's face at a distance of approximately nine inches.

Subsequent analysis showed the solder to consist of 65% tin and 35% lead, over which a layer of copper had been deposited electrically.

At a pressure of 10 lbs., the solder would have no great penetrative power, but would be resolved into minute globules, and the patient states that, in the early stages, the skin on his face was profusely bespattered; this feature was not present when he was examined later.

He continued to work for a fortnight after the accident until increasing photophobia and lacrimation compelled him to report to the Royal Eye and Ear Hospital.

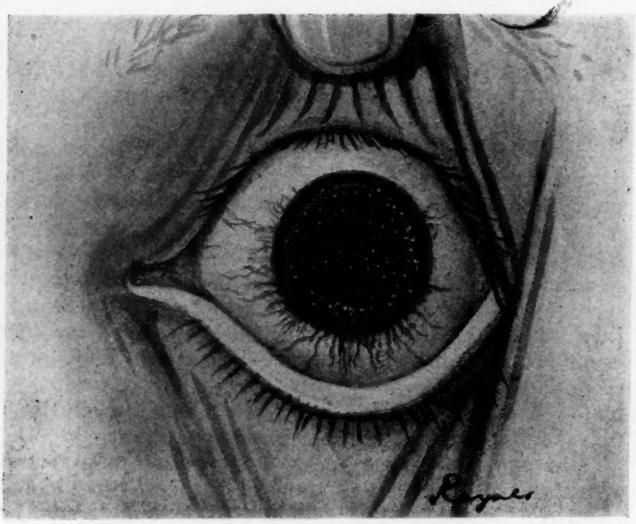
An examination showed a condition of intense bilateral blepharospasm due to photophobia.

The skin of the eyelids and face was normal and showed no evidence of scars or burns; there were no embedded particles.

Previous general, family and ophthalmic history were negative.

The naso-lacrimal apparatus was normal.

Under cocaine anaesthesia, it was possible to evert the lids. There were no embedded particles in the palpebral or bulbar conjunctiva, but a few were found, freely movable, in the inferior fornix. There was marked superficial conjunctival hyperaemia.



The corneae of both eyes were stippled by a multitude of fine glistening metallic particles, evenly distributed and more marked in the left eye. The minuteness of these fragments is difficult to depict in a drawing, but the accompanying plate, painted under cocaine anaesthesia, gives a fair idea of the condition.

A slit-lamp examination revealed that the foreign bodies were situated in the corneal epithelium and in the superficial layers of the substantia propria. There was no penetration of Descemet's membrane.

The anterior chamber, iris, capsule, lens, and fundus were normal in both eyes. The digital tension was not raised. The vision was O. D. 6/12, O. S. 6/12.

There was no stain of the corneae with fluorescein or mercurochrome.

Treatment.—The various methods of treatment were considered and it was decided to allow secondary ulceration to occur.

Boracic lavage, atropine mydriasis, and London smoke glasses were prescribed.

At the end of fourteen weeks of this treatment a further investigation showed that, although a few particles had been extruded, there was no great change in the condition.

Epiphora, photophobia and pain remained extreme and a change in the treatment was indicated on this account and for economic reasons.

Accordingly, then, the patient was admitted to hospital for exfoliation of the corneal epithelium.

After a speculum had been inserted into the left eye, the cornea was frequently douched with a 4% solution of cocaine and allowed to dry.

When the epithelium was uniformly opaque, an attempt was made to remove it by means of cotton wool twisted on a probe.

This had no effect, so that a fine discission needle was employed and, by it, the whole of the epithelium was scraped off until the cornea stained uniformly with fluorescein. Atropine and flavine in paroleine were then instilled.

It was noticed that although a considerable amount of force was used, few of the foreign bodies were dislodged although the surrounding epithelium was removed, indicating the marked cohesion between the cornea and the metal.

One week later, the condition had improved; the irritation was less and the patient was able to resume his employment. Six weeks later, the foreign bodies had become distinctly fewer and the patient was at work.

The present visual acuity is 6/9 in each eye, but as there are still many particles left on both corneae, this may not be the final result.

It is a great pleasure for me to thank my chief, Mr. J. Duff McCulloch, for permission to publish this case and gratefully to acknowledge my indebtedness to Messrs. Rayner for providing the drawing.

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MEDIAEVAL OPHTHALMOLOGY IN MESOPOTAMIA

BY

A. F. MACCALLAN, C.B.E.

LONDON

" In the name of God, the Compassionate, the Merciful!

" The book of Hunain ibn Is-Haq on the structure of the eye, its diseases and their treatment written in accordance with the opinions of Hippocrates and Galen."

This is the preface to the earliest existing systematic text-book of ophthalmology, which has been translated by Meyerhof of Cairo, and has been published together with the Arabic text by the Government Press, Cairo, 1928.

The history of the discovery of the manuscript is of considerable interest.* When Hirschberg began his investigations of Arabic ophthalmology, with the help of the orientalists Lippert, Mittwoch and Mann, he found Hunain's name frequently mentioned in the old Arabic and Persian text-books on eye diseases as an author of great repute. With admirable philological insight Hirschberg discovered the " Ten Treatises " of Hunain in two Latin translations, one printed at Lyons in 1515, the author being given as Constantinus Africanus, and the other printed at Venice between 1541 and 1625, authorship being attributed to Demetrius, a Sicilian Greek. So both Constantine and Demetrius separately

* MacCallan, " The Birth of Ophthalmology, etc.," *Brit. Jl. of Ophthal.*, Vol. XI, p. 66, 1927.

had translated the original Arabic of Hunain into Latin and each had described himself as author.

Meyerhof then set himself the task of finding an Arabic MS. of Hunain's original work. At first he was unable to discover this in any of the public libraries of the Occident or of the Orient, but hearing that a private gentleman possessed a collection of ophthalmological manuscripts he obtained facilities for examining them. This Egyptian country gentleman is Taimur Pasha, whose forebears were officials of importance in the reigns of Mohammed Ali Pasha, and of Ismail Pasha. He is a great collector of ancient manuscripts, and has built for their accommodation in Cairo a private library, where as a serious Arabic scholar he spends most of his time. The thanks of ophthalmologists are due to him for his liberality in giving access to his literary treasures to scholars of all nationalities.

In this library Meyerhof discovered in 1908 an original MS. of Hunain's " Ten Treatises," which had been obtained from Beirut in Syria. Unhappily, it was not complete. In 1925, Meyerhof obtained a catalogue of Arabic manuscripts which had been collected by Gregory IV, the Patriarch of Antioch, and were in a Leningrad library. This catalogue had been published in Leningrad by Professor Krackovski in 1924, and among other important Arabic MSS. referred to the existence of the " Ten Treatises." Through the kind offices of Professor Krackovski, a copy of the MS. was made and sent to Meyerhof in Cairo. It was found to be not quite complete but the gap was partially filled by quotations of the original by an Arabic author which Meyerhof obtained from the Escorial library, in 1928, after having long searched in vain.

Meyerhof took Taimur Pasha's MS. as his basis and corrected from the Leningrad copy, having at his disposal the Latin translations.

History of Hunain

Abu Zaid Hunain ibn Is-Haq el Ibadi was born at Hira in Mesopotamia in the year A.D. 809. He was the son of a Nestorian Christian druggist. He first studied medicine at the Persian-Syriac Medical School of Gandeshapur, and then passed several years in perfecting himself in the Greek language. After this he went to Basra to study Arabic, where he entered the service of the physician to the Caliph El Mamun, who appointed him superintendent of his " House of Wisdom," a kind of library-academy. Here he produced an amazing quantity of translations of the books of Galen, and of other Greek medical and philosophical authors. He also made long journeys through

Mesopotamia, Syria, Palestine and Egypt in order to find Greek scientific manuscripts during succeeding caliphates.

Under the Caliph El Mutawakkil, A.D. 847 to 861, Hunain reached the summit of his prosperity as a medical practitioner and translator, but the envy of his fellow Christian colleagues lost him his favour with the Moslem potentate. At one time the Caliph ordered Hunain to prepare a poison for an inconvenient subject, and on his refusal imprisoned him for a year. When he was again brought before the Caliph and asked why he refused, even under threat of death, Hunain replied: "Two things, my religion and my profession! My religion commands us to do good, even to our enemies, so much more to our friends, and my profession forbids us to do harm to our kindred, as it is instituted for the benefit and the welfare of the human race, and God imposes on physicians the oath not to compose mortiferous remedies."

A few years later, Hunain was denounced to the Moslem Caliph as a heretic in his Nestorian faith, so he was made to spit on an image of the Virgin and handed over to the head of the Church at Baghdad, by whom he was imprisoned and flogged from time to time, while the Caliph confiscated his goods. But it was the loss of his books that affected him most: he says "I had lost all the books which I had gradually collected during the course of the whole of my adult life in all the lands in which I had travelled, all of which books I lost at one blow."

After four months of imprisonment, Hunain regained the favour of the Caliph by a successful cure, his fortunes were restored and his enemies disgraced. Henceforth, he was left in peace to continue his translation work for a period of 20 years, being assisted materially by his nephew Hubaish, and by numerous pupils.

Hunain died about A.D. 877 at the age of 68 years. He appears to have passed a pleasant life. He rode every day, came back and had a Turkish bath, drank a cup of wine and ate a cake. He then slept a little, after which he dined on a chicken and a loaf of bread. He limited himself, as regards alcohol, to half a gallon of old wine daily. It is interesting to note that he wrote a book "On the Diet of Old Men."

Hunain's Translations

Prof. E. G. Browne states that Hunain translated the Greek into Syrian, while his nephew Hubaish translated the Syriac into Arabic, which Hunain then revised; but sometimes he translated direct from Greek into Arabic. Hunain states that when he found manuscripts defective he made every endeavour to obtain other

copies for the purpose of collating the best possible text, in fact his philological methods were quite modern.

The number of his translations was very large. It included 95 books of Galen, many of the works of Hippocrates, of Paulus Aegineta, of Oribasius, of Dioscorides, and of Aristotle.

Hunain as an Author

More than 100 different works have been ascribed to Hunain, no doubt many erroneously. Hunain's original books naturally reflect the works of the Greek physicians, the translation of which constituted the essential activity of his whole laborious life. The book which made him famous in Mediaeval Europe was his introduction to the " Ars Parva Galeni," which was translated into Latin under the title " Isagoge Johannitii " and printed at Leipzig in 1497. Other books treat of diet, fever, the pulse and the urine, while another is on veterinary medicine.

However, the greatest and most famous book Hunain wrote is " The Ten Treatises on the Eye." Meyerhof has written an interesting introduction, from which the present article is compiled.

The *first treatise* gives the anatomy of the eye according to Galen, with all his mistakes which were dominant for 1,400 years. Thus the crystalline lens, which in Arabic is translated as " the ice-like humour," is placed in the middle of the eyeball and is made the principal organ of vision. The other tunics and humours of the eye are supposed to be for the purpose of protecting and nourishing the lens. The retina is recognised as the terminal extension of the optic nerve but its true function is unknown. The six muscles of the eye are well described, but to them is added a retractor bulbi, a muscle which only occurs in certain mammals. This mistake was the obvious result of the dissection of animals instead of the human body.

It is interesting to remember that all these errors were repeated by the great anatomist Vesalius, in the middle of the sixteenth century. It was about that time that Falloppio proved the non-existence of the retractor bulbi, while the real position of the lens was not described until the year 1600 by Fabricius ab Aquapendente. It was not until 1604 that Kepler found out the true nature of the lens and retina.

The *second treatise* deals with the description of the brain on the lines of Galen.

The *third treatise* describes the optic nerves, the visual spirit and vision itself. The visual spirit " is a kind of animal spirit which enters the two anterior ventricles of the brain, where it is thoroughly matured, subtilised, purified and extracted and arranged, ... according to the nature of the brain."

The *fourth treatise* is an extract from various books of Galen on drugs, treatment, aetiology and symptomatology.

The *fifth treatise* is a theoretical exposition of hypothetical diseases of the membranes and humours of the eye.

The *sixth treatise* is particularly interesting because it has no model in Galen's existing works. It probably follows his lost treatise "The Diagnosis of Eye-diseases." It begins with the symptoms of conjunctival diseases. An entirely new fact here comes to light that pannus was not observed for the first time by the Arabs but was known to the Greeks under the name of kirsophthalmia.

The *seventh and eighth treatises* deal with simple remedies.

The *ninth treatise* describes the operation of couching a cataract.

The *tenth treatise* contains a number of prescriptions for ophthalmic remedies. It has the following preface by Hunain:—"During more than thirty years I had composed different treatises concerning the eye in which I pursued divergent aims about which I was questioned by several people one after another. Then one of my friends (his nephew Hubaish), collected those treatises and asked me to give them titles after having united them all in one volume in a convenient manner and so I did this."

Hunain ends his volume with the satisfying sentence:—"This is a book containing all the knowledge necessary for those who wish to treat the diseases occurring in the eye in a reasonable manner."

It is difficult to compute the days and nights of labour which Meyerhof must have spent in preparing this book for publication, and as difficult to estimate the heavy private expenditure which it must have involved. However, most of us can dimly appreciate the scholarship required for work of this kind, and congratulate Ophthalmology on having so erudite a disciple.

MARGINAL DEGENERATION OF THE CORNEA

BY

J. H. DOGGART

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MARGINAL degeneration of the cornea is a rare, bilateral condition, twice as common in men as in women, with opacity and vascularisation of the peripheral zone of the cornea as its earliest signs. The epithelium remains intact, but there follows a progressive thinning of the cornea at the expense of Bowman's membrane and the anterior layers of the substantia propria, so that a gutter is formed.

As the stroma slowly continues to melt away, the gutter deepens until at last this portion of the cornea is rendered unable to sustain the normal intra-ocular pressure, and begins to bulge. This final stage of ectasia is in many cases delayed until 10-20 years after the onset of degeneration. The upper half of the periphery is more commonly affected than the lower. If the whole circumference is involved, the process is usually further advanced above than below. An inferior ectasia is exceedingly rare. The process of attenuation steadily advances in its original situation, and often, but by no means always, extends further round the circumference. It is sometimes possible to detect, in one and the same cornea, a normal zone, a furrow, and an ectasia. Multiple localised, vesicular ectasiae may occur at intervals along the course of a furrow. Between the limbus and the peripheral edge of the opacity, there intervenes a strip of apparently clear cornea, but the slit-lamp reveals a continuation of small greyish dots in the deeper layers of the stroma right up to the limbus (*cf.* arcus senilis). Until the characteristic furrow appears, marginal degeneration can simulate arcus senilis, but a more detailed examination reveals the presence of fine vessels encroaching on the opaque area if the case is really one of marginal degeneration. The two conditions are quite distinct, because: (1) Approximately one-third of some 80 cases described with more or less detail in the literature were under the age of forty. In a few instances, the patient has been under twenty years old. (2) In several instances even of elderly patients suffering from typical marginal degeneration, the absence of an arcus has been specifically mentioned. (3) Furrows have been seen separate from, and bearing either a peripheral or a central relation to an arcus. On its peripheral side the furrow shelves gradually, but its central edge is steep. This central edge becomes increasingly accentuated, and stands out during the ectatic stage as a wavy white line, of a chalky appearance. The radial vessels and their loops rarely transgress the white line by more than a millimetre, and in most cases are sharply arrested thereby. Occasionally a furrow is limited both peripherally and centrally by white lines, whose extremities fuse at the ends of the crescent. When the stage of ectasia is reached, the affected area of the cornea inevitably regains some of its transparency because of the exaggerated thinning.

One important effect of marginal degeneration is a flattening of the cornea in that meridian which passes through the middle of the furrow or ectasia. Since the upper half of the periphery is the favourite site for these formations, the vertical meridian suffers a reduction in its curvature. Hence follows an astigmatism against the rule, amounting frequently to more than 10 D., and in a few cases to as much as 20 D. Moderately good visual acuity may be obtained by trial of a high minus cylinder with its axis vertical, but in most

cases the much less advanced degree of the deformity in the patient's fellow eye prevents him from wearing the appropriate glass. On the other hand, it may be impossible to improve the vision by test lenses, more particularly in those eyes where the furrow is seen to extend round most of the circumference. In such cases the central portion of the cornea may bulge diffusely as a result of its impaired nutrition. This complication produces an irregular astigmatism, not amenable to improvement by test-lenses, and clinically bears a rough resemblance to the picture of keratoconus. Sometimes in advanced cases there are small, ill-defined areas of opacity scattered irregularly in the substantia propria of the central portion of the cornea, remote from the limiting white line. The sensibility of the cornea to touch is usually unimpaired in the unaffected areas, and in an early opacity; diminished or absent on the floor of a furrow; completely absent over the ectasia. Intra-ocular tension is normal. In a large proportion of cases, pterygia or pseudo-pterygia, which sometimes undergo spontaneous resolution, have been described.

The cardinal symptom is a slow failure of vision in one eye, followed after a number of years by the onset of a similar disability in the other. Symptoms in the second eye may be delayed as long as 25 years. Even so, the proportion of unilateral cases in the literature is small. Therefore it would seem reasonable to foretell, concerning any individual unilateral case, that his other eye will in time become involved if he lives long enough. In one-third of the cases at least, there is a history of intermittent conjunctivitis or vague irritability and discomfort of the eyes, preceding the visual failure by an interval, maybe of years. The possible significance of these attacks will be discussed later. Since the disease progresses slowly, and is for a long time limited to one eye, many patients remain for years in ignorance of any disability. Their ignorance may be suddenly dispersed by the dramatic event of a ruptured globe. It is only to be expected that an ectatic area, whose thickness is about one-quarter the thickness of the normal cornea, stands in danger of perforation from slight trauma. Several examples of this mishap are on record. In Uhthoff's patient, a gentle poke with a finger sufficed to rupture the cornea and extrude the lens. Twelve years later, this unfortunate man suffered the same disaster in the other eye as a result of a similar blow. An ectasia sometimes gives way after a fall on the ground, without there having been any direct blow on the eye. Schutz reports the case of a boy of 18 who woke up one morning to feel a pain in the left eye. There was a perforation of the cornea with prolapse of iris. Another curious feature of this unique case was the behaviour of the right eye, which also became painful two days later. It was found to show a typical upper peripheral vascularised ectasia limited by a white line, and appeared to be threatened with the same fate

as the other eye. Under treatment by eserine and a pressure bandage, this right ectasia subsided ten days later.

Thinning of the corneal periphery naturally calls for extreme care in the event of an operation becoming necessary for the extraction of a senile cataract. Axenfeld and Gifford each report a successful extraction, although Axenfeld's case occasioned some temporary anxiety by developing ring infiltration. These operators both used a conjunctival flap to fortify the cornea in the neighbourhood of their section. Is it possible that the pseudo-pterygia repeatedly observed in marginal degeneration represent an attempt on the part of the tissues to guard against the risk of rupture by drawing a hood of conjunctiva over the danger zone?

Operations to arrest the disease have been undertaken by several surgeons. Terrien treated a patient 30 years ago by repeated cauterisation of the ectatic area, with the object of reducing the astigmatism by cicatricial contraction (*cf.* scarring after cataract extraction, with lessening in the amount of astigmatism against the rule). Four months after the beginning of this treatment, Terrien was able to report that the amount of astigmatism in the worse eye was reduced from 11 D. to 1 D. Adamantiadis adopted Terrien's plan with partial success. J. H. Fisher obtained useful corrected vision, and converted an astigmatism ***against*** the rule to an astigmatism ***with*** the rule by excising a lunula of ectatic cornea, whose pathological appearances were subsequently described by Coats. In most cases of this disease, active treatment is not indicated. Relief is afforded by the prescription of glasses to correct the astigmatism, if the discrepancy between the refraction of the two eyes is not too great.

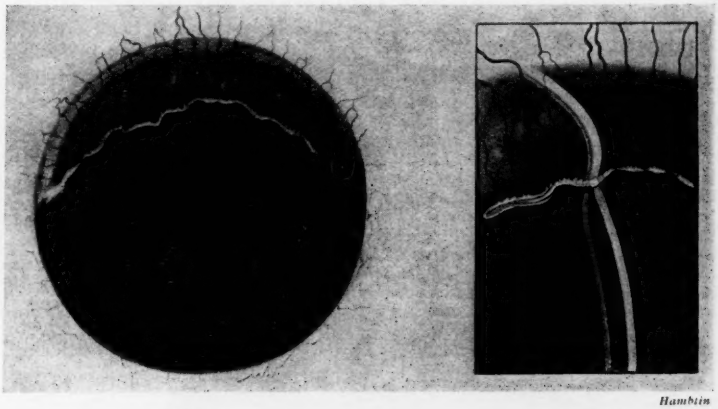
Pathological findings have been described in detail by Fuchs, Seefelder, Rupprecht, and Coats. They confirm the clinical observation of corneal thinning with a sharp central boundary. The epithelium is ***in situ***, though the form of its cells, especially of the basal ones, may be modified. Bowman's membrane and the anterior layers of the substantia propria are usually described as being absent, but Fuchs in his second paper regards them as merely thinned and teased out into slender fibrils. Deep to the epithelium is a layer of vascular granulation tissue showing little or no infiltration with inflammatory cells. Seefelder observed numerous fat granules in the stroma of the floor of the furrow, and between some of the normal lamellae lying central to the limiting line. According to most of the observations, Descemet's membrane was practically normal, but Coats found it laminated and thickened fourfold. To explain this atypical thickening, Coats postulated a slow process allowing time for resistance. Fisher emphasised the comparative youth of the patient (aged 41 years) as likely to be attended by a high grade of proliferative activity in Descemet's endothelium.

The cause of this disease is unknown. Bacteriological investigations have produced negative or inconstant results. Three cases have been reported after trachoma; one other case in association with iridocyclitis; one with glaucoma; one with a history of malnutrition from war rations. Two cases of Cattaneo showed hypercholesterinaemia. Most or all of these facts might well be coincidental. There has been disagreement as to whether the disease is essentially a degenerative or an inflammatory process. The slow progress and the bilaterality suggest degeneration, but a low-grade inflammation has been adduced as the reason for the preceding symptoms of irritability noticed by a large proportion of patients. Some cases feel no premonitory pain. Some may be giving a history of an ordinary attack of conjunctivitis not in any way connected with the subsequent marginal degeneration. Others may owe their symptoms to a low-grade astigmatism arising in the early stages of the disease, and interfering with binocular vision. Nevertheless, there seems to be a group of patients who give a very definite history of pain coming on for no apparent reason; an intermittent pain that altogether disappeared before any visual symptoms arose. If the disease really is a degeneration, as most of the evidence indicates, then these attacks of pain might well be due to irritation from the products of histolysis when the corneal stroma begins to suffer destruction. After a time, some form of immunity to the histolytic substances is acquired, and the pain ceases.

Sir John Parsons has kindly given me permission to report a case of marginal degeneration in a patient under his care at Moorfields Eye Hospital. The patient is a schoolmaster, now aged 44 years, who first attended Moorfields in 1907, suffering from conjunctivitis. The inflammation affected chiefly the lower palpebral portion of each conjunctiva, and was not very severe. At that time he had in each eye 0.5.D. of astigmatism, correction of which gave 6/6 vision. In 1916, at the age of 30, he returned on account of recent attacks of pain in the left eye. This pain was always worse in the mornings, and nothing relieved it. A vascularised peripheral gutter was noticed in the upper portion of the left cornea. With the old correction, vision of 6/9 was obtained. At the end of 1920, he complained that the sight of the left eye had been failing for one month. Left vision was now 6/12 with the aid of his 1909 glass; right vision unaltered. In 1925, left vision had fallen to 6/36, and in 1928 to 6/60 with the old correction. When he again attended Moorfields this year, the left vision was reduced to finger-counting, with or without his glass. He now complained of pain in the right eye like the pain he felt in the left eye in 1916. Refraction yields these results: R.V, $\bar{c} - 0{\cdot}5$ D. cyl., $\curlyvee 105° = 6/6$; L.V. $\bar{c} + 2{\cdot}0$ D. sph. and $-12{\cdot}0$ D. cyl., $\curlyvee 90° = 6/12$ mostly. On

naked-eye inspection, the right eye appears normal; the left eye, as depicted in Figure 1, shows a crescentic vascularised ectasia situated at the upper portion of the periphery, and measuring about 3mm. across the widest part. Centrally the ectasia is bounded by a distinct wavy white line, at which the vessels stop short.

Figure 2, a slit-lamp section of the left cornea in the neighbourhood of the ectasia, demonstrates the protrusion of the cornea, which is here only one-quarter of its normal thickness. On slit-lamp examination, endothelium is not visible in the middle, but its amorphous remains appear in the lateral portions of the ectatic zone.



Hamblin

FIG. 1. FIG. 2

Immediately below the two ends of the white line, the corneal stroma for a distance of 1mm. shows abundant small, glistening crystals, and ill-defined greyish opacities. At the lower limbus, in the region 7 to 5 o'clock, there is an abnormal accentuation of the scleral prongs that compose the palisade zone; an encroachment here and there of conjunctival vessels on the cornea for a distance of 1mm.; a number of scattered greyish dots of opacity in the substantia propria; but as yet no demonstrable thinning of the cornea. These phenomena presumably denote the beginning of that process whose later stages are evident in the upper periphery. In the right cornea, which appeared normal to naked-eye inspection, the slit-lamp revealed, at the 10 to 2 o'clock and the 7 to 5 o'clock regions of its periphery, the same early changes without any appreciable thinning. A furrow will almost certainly appear on the right cornea at some future time.

This clinical entity has been given various names; *e.g.*, furrow keratitis, marginal ectasia, and marginal degeneration of the

cornea. The last of these three is manifestly the most descriptive, because furrowing and ectasia, although inevitable, are merely landmarks in the progress of the degeneration.

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A CASE OF CRATER-LIKE HOLE IN THE OPTIC DISC

BY

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A MARRIED woman, aged 31 years, recently attended Mr. R. R. James' Out-patients at St. George's Hospital, complaining of headaches. Vision of 6/9 and 6/6 is obtained in the right and left eyes respectively after correction of a small amount of compound myopic astigmatism. The left fundus is normal. In the right, there is a large inferior crescent showing heaped-up pigment along most of its lower border. An oval, greyish-blue hole is situated in the infero-temporal quadrant of the optic disc, lying with its long axis in the direction of the long axis of the disc. The depth of this hole is about 9 D. No vessel is visible on the floor, although two smaller ones can be seen in close relation to its margins. The macular region is normal.

Since the original description of this rare congenital anomaly by Wiethe in 1882, about forty such cases, two-thirds of them in women, have been recorded. The holes are usually unilateral,

FIG. 1.

single, not associated with defective vision, and appear by ophthalmoscopic estimation to be about 10 D in depth. They are nearly always situated in the infero-temporal quadrant of the disc. Blood-vessels are seldom seen on the floor. In a few cases, the clinical picture has been complicated by pigmentary changes at the macula, with corresponding defects in the central field. Occasionally, as in the present instance, there is a crescentic or irregular extension of the disc in the neighbourhood of the hole. There are also several examples of a disc with more than one hole. It is matter for curiosity that, in van de Hoeve's patient with three holes in the right disc, the only unaffected quadrant was the infero-temporal. Paracentral scotoma attributable to crater-like hole is said to occur. In the case I record here, it is impossible to blame the hole for any of the irregular field defects mapped out on the accompanying charts. These defects might well be due entirely to the inferior crescent. In the central portion of the right field, plotted out on a

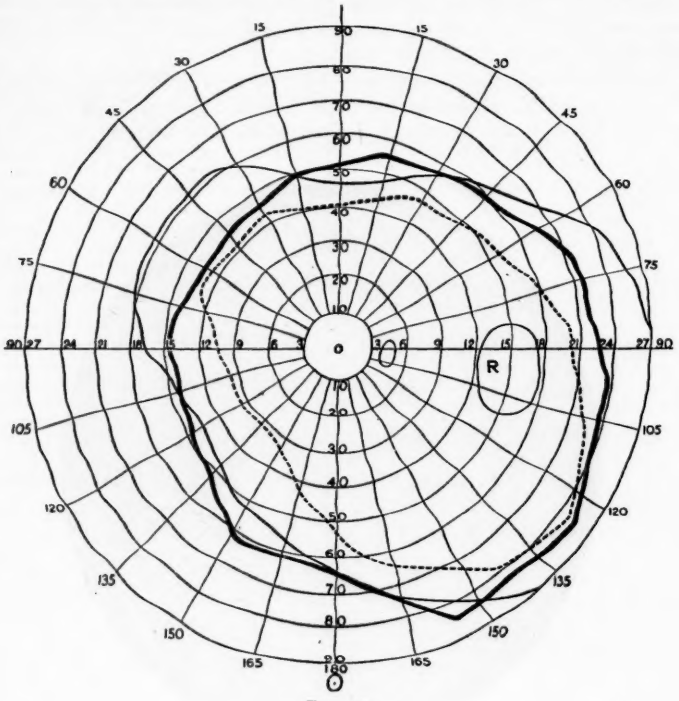

FIG. 2.

Thick black line=field plotted with 10/330 moving white object.
Dotted line=1/330 object.

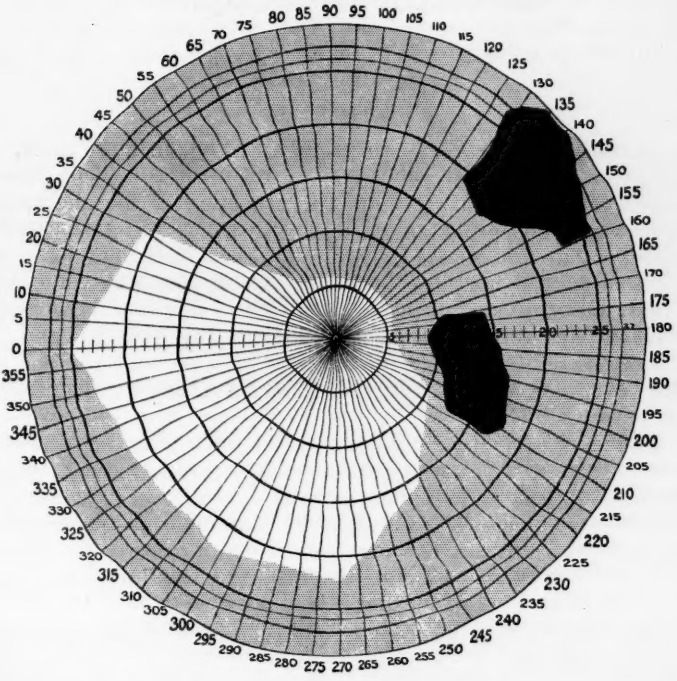

FIG. 3.

Black area=enlarged blind spot, plotted with 10/2,000 object. Dark grey area=deficiency for 4/2,000 object. Light grey area=deficiency for 2/2,000 object.

Bjerrum screen by Traquair's method, there is an enlargement of the blind spot; a large relative scotoma supero-temporally; and a wide area of relative defect for the smallest object used. Control observation on the unaffected eye reveals no abnormality. The central field of this patient's right eye affords an illustration of the extensive defects compatible with good test-type vision and a fairly good peripheral field. Indeed, the actual discrepancy between the two eyes is even greater than the chart would indicate, because the smallest feasible test-object for the right eye is 2 mm. in diameter. The 1 mm. object, whose presence the left eye can appreciate over almost the entire screen, is invisible to the right eye, save in the region of the fixation-point.

To Mr. James, who himself published a case of this anomaly in 1913, I wish to express my thanks for allowing me to publish this report. A bibliography was given in *The British Journal of Ophthalmology*, Vol. XI, p. 16, 1927.

AN OCCLUDER FOR SQUINT

BY

A. RUGG-GUNN

LONDON

A RELIABLE occluder plays an important, and, in most cases, an indispensable part in the early treatment of concomitant convergent strabismus. With the exception of the alternating type, every constantly squinting eye sooner or later acquires amblyopia in the central area of the visual field and loses the power of central fixation. Re-education of this amblyopic area is notoriously difficult even after the need to suppress the image is removed from the squinting eye by correcting glasses.

Many varieties of occluder, aiming at total occlusion of the better eye, have been devised, but nearly all reveal in practice some defect which invalidates their use. The better eye also is capable of exercising remarkable ingenuity in outwitting an occluder. Even when total occlusion has been successfully attained, several practical objections may be present. Either the appearance is unsightly and disliked by the parents; or ventilation is inadequate; or the mental effect, which may sometimes approximate to terror, of nearly blinding the child by depriving it of its only functioning eye, may be so unpleasant that it is impossible to continue its use. Above all, beneath the occluder the eye assumes the squinting position and convergence remains undisturbed.

Usually total occlusion is not attained. The better eye can be depended upon to discover very quickly the occluder's weak points and to find some means for maintaining vision. This surreptitious vision is usually carried on, with the aid of a tilt of the head, in the worst possible position; viz.: extreme convergence, through a minute space which appears between the edge of the occluder and the bridge of the nose.

The principle of complete occlusion hitherto generally observed does not appear to be necessary or even desirable. In the following description of an occluder it will be found that this principle has been dispensed with and the disadvantages enumerated above disappear. The design (Fig. 1) is very simple. It consists of two parts—a " half lens " of Chavasse glass which covers rather more than the nasal half of the spectacle lens, behind which it is worn, and a rubber projection which can be trimmed where necessary to fit into the inner aspect of the orbit.

Chavasse glass has one surface plain and the other mottled, the effect being to permit a perfectly clear view of the eye while at the same time vision is reduced to 6/60ths or less.

The temporal rim of the occluder is straight and forms a vertical

line which should coincide with the temporal margin of the pupil in ordinary daylight or about 2 mm. to the temporal side of the optical centre of the spectacle lens. The remainder of the rim is

FIG. 1.

curved and follows that of the spectacle frame but has a projecting margin of rubber designed to fit accurately into the nasal side of the orbit and rest against the bridge of the nose. The rubber margin is easily trimmed by means of scissors to the required shape and its deepest part ought to touch the inner canthus. The

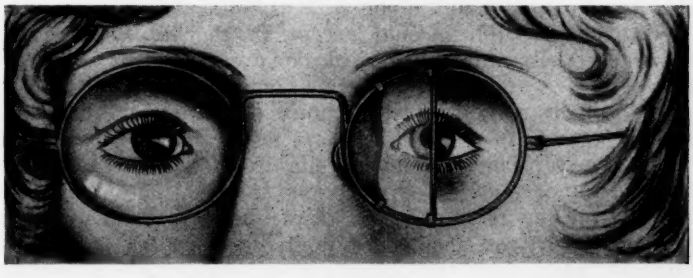

FIG. 2.

object of the projection is to block up the space between the nose and the spectacle frame. Four soft metal clips help to clamp the occluder to the back or ocular surface of the spectacle lens. The rubber margin is sufficiently pliable to accommodate spectacle bridges both of the ordinary and " scholar " type.

The occluder (Fig. 2) when worn, is almost invisible. Central vision with the better eye is still possible, especially when the head is tilted slightly to the other side, but it is only possible in the position of outward deviation, that is, of relaxed convergence.

In all other positions only the peripheral field or least sensitive part of the occluded eye can function. As the acquired amblyopia of squint is confined to the central retinal area, peripheral vision in the two eyes is practically equal and becomes obviously so to the patient under the new conditions imposed by the occluder. As a result suppression of the visual images in the squinting eye is less likely to occur. As another result free movement of the squinting eye is encouraged. This is an important step towards establishing binocular vision, for the difficulty of overcoming the relative immobility of a squinting eye is second only to that of overcoming its amblyopia. The simultaneous use of both eyes becomes possible in all positions and the way prepared for ultimate bimacular fixation.

Further, in the only position in which macular vision is permitted to the better eye, that is, in abduction, both visual axes approximate to parallelism. This is important, because, not only is convergence relaxed in this position, but retinal images become placed on relatively corresponding points. Thus the original motive for suppression is removed. Complete correspondence of retinal points does not seem to be necessary for bi-macular fixation, as psychical fusion helps to overcome minor amounts of discrepancy.

The association between spasm of accommodation and excessive convergence is attacked at two different points. Correcting lenses relax accommodation and along with it undue convergence, while inability to use the macula except in the position of least convergence helps further to break down excess of the latter and perhaps thus, secondarily, relieves accommodative spasm.

The occluder should be worn continuously over the better eye and the progress of the squinting eye tested from time to time in the usual way. The same device, slightly modified, may be used for concomitant divergent strabismus. It should in that condition be fitted on the temporal side of the better eye. There is a temptation to try the effect of two in divergent squint, one on each temporal half, but the effect is to encourage alternating suppression and a better result is obtained with only one.

Summary

(1) The occluder may be said to be practically invisible.

(2) It permits central vision of the occluded eye only in the position of relaxed convergence.

(3) It emphasizes the relative equality of peripheral vision in the two eyes, encouraging more reliance on the squinting eye and thus—

(*a*) discourages its desire for suppression,

(*b*) overcomes its relative immobility.

(4) It encourages a position of the visual axes in which images fall on relatively corresponding points.

(5) By relaxing excessive convergence it may secondarily relieve accommodative spasm.

The makers of the occluder are Messrs. Theodore Hamblin, Ltd., 15, Wigmore Street, W. to whom my thanks are due for skilfully carrying out my suggestions.

THE FIELDS OF VISION IN MINERS' NYSTAGMUS

BY

G. F. HAYCRAFT

WOLVERHAMPTON

IN the *Ophthalmoscope*, Vol. XI, p. 727, writing on the fields of vision in miners' nystagmus Cridland reported a concentric contraction for white, blue and red with occasional interlacing of red and blue. In the majority of cases the fields for the different colours maintained their usual relative proportions. I have been unable to find any further reports on this subject.

I have recently examined the fields of vision in a series of 43 cases. Of these, 35 were old, and eight new cases. In the latter class I include those certified as suffering from the disease within the last six months.

The list of old cases was compiled as follows:—

Certified as Miners' Nystagmus	*Number of Cases*
1 year	6
2 years	6
3 years	3
4 years	3
5 years	5
6 years	3
7 years	1
8 years	3
10 years	1
*12 years	1
*15 years	2
*25 years	1
Total	35

*These four men had resumed work underground for two or three periods of from 2 to 4 years.

Of the eight recent cases I found:—

Showing oscillation of the eyeballs	6
Contraction of field for white	8
Contraction of field for colours	2
Interlacing of colour fields	2
Colour fields not taken on account of difficulty ...	3

In the old cases, 35

Showing oscillation	21
Contraction of field for white	29
Contraction of field for colours	22
Interlacing of colours	22
Blue field smaller than red	9
Fields normal	3
Colour fields not examined	4

Lister's perimeter was used in good daylight.

The objects were white, blue and red discs of 20 millimetres diameter.

The fields in this series were, in the majority of cases, so similar in form and so suggestive of a definite type that they could not possibly have been produced by malingering. About half of them were taken by my assistant and any unconscious tendency to "cooking" the results was avoided by this division of labour.

Cridland tells me that in taking the red field he often found a band in which the colour was named as "orange" before a red sensation was admitted. I can confirm this though I did not take the trouble to map out the band.

My results are in almost complete agreement with Cridland's; the only difference being that I found a greater proportion of interlacing of the fields for red and blue.

Conclusions

1. In a large percentage of cases of miners' nystagmus there is a definite alteration in the fields of vision.

2. The commonest change is a concentric contraction for white.

3. A large number show contraction for red and blue and interlacing of these colours is frequent.

4. The amount of contraction of the fields is usually but not invariably a measure of the severity of the disease.

5. In the absence of physical signs, the change in the fields described above combined with typical subjective symptoms can be relied upon in diagnosing miners' nystagmus or in determining that recovery is still insufficient to permit work underground.

ANNOTATION

Ophthalmic Disabilities among the Clergy in Mediaeval Times

The following abstract and notes are taken from the publications of the Cantilupe Society, which society was formed about twenty years ago with the object of transcribing and publishing the Registers of the Bishops of Hereford. They throw some light on ophthalmic disabilities in mediaeval times and may be of interest to our readers.

September 6, 1322. Adam[1], to his well beloved in Christ, Robert, Vicar of Fownhope, greeting. The works of Charity and the importance of your conversation and other virtuous gifts with which God, in his infinite mercy, has blessed you, demand that we should gratify you as much as we are able, the Lord being our helper. If you wish to resign the present vicarage which you hold; with our diocesan authority, by these presents, we grant indulgence that notwithstanding the defect which is very apparent in the pupil of one of your eyes, you may be admitted to any other vicarage in our diocese if it is canonically offered to you, and instituted in the same. In witness whereof, etc., Dated at Prestbury, VIth day of September, A.D. MCCCXXII.

In the Register of Thomas Spofford[2], under date 26 August, 1429, John Delew receives a dispensation that he may be ordained in spite of a defect (*macula*) which he has in his right eye.

In the Register of Charles Bothe[3], dated 29 March, 1521, occurs a dispensation to Walter Winnall to all the Holy orders in spite of a clouding (*nebula*) of the left eye.

Whether it was common form or not for a parson with any corporeal defect to have to obtain a dispensation from the Bishop of his diocese in order to take a post in the diocese, we do not know; or whether this occurred solely on the Welsh Marches. The Bishops of Hereford would appear to have had liberal ideas in ophthalmological matters.

In the case of the two latter parsons the defect is clearly stated, and was probably the result of a previous corneal ulcer of severe type. It is not easy to offer a solution in the first case, but we would suggest a coloboma of the iris as a possible condition.

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1 Adam Orleton, Bishop of Hereford, A.D. 1310-1327.

2 Thomas Spofford, Bishop of Hereford, A.D. 1421-1448.

3 Charles Booth, Bishop of Hereford, A.D. 1516-1535.

INTERNATIONAL ORGANISATION FOR THE CAMPAIGN AGAINST TRACHOMA

The International Anti-Trachoma Organisation, the foundation of which had been resolved upon last year at the International Ophthalmological Congress in Amsterdam, was inaugurated in Geneva at the end of July. The sittings were held in the Palace of the League of Nations building. Twenty-one different States were represented there by forty delegates, Professor Dr. Emil de Grosz being in the chair. The session had three tasks before it: to pass the statutes, to form an Executive Committee and to decide upon the programme of the near future. The following were elected to hold office: President of the Organisation for the period of five years, Professor Emil de Grosz; Secretary General: Dr. Wibaut (Amsterdam); Secretary: Dr. Tewfik (Cairo); Vice-Presidents: Messrs. Angelucci (Naples), Birch-Hirschfeld (Königsberg), MacCallan (London), Marquez, Chairman of the International Ophthalmological Congress in Madrid, Morax (Paris), Park Lewis (Buffalo, U.S.A.), Szymansky, President of the Polish House; other members of the Executive Committee are: Messrs. Brandes (Antwerp), Kadlicky (Prague), De Lapersonne (Paris), Miyashita (Tokio), and van der Hoeve (Leyden).

The representatives of the Hygienic Committee of the League of Nations: M. Lutrario, former chief of the Italian Medical Department, and M. Jitta, Chairman of the Dutch Board of Health, will join the Organisation. The representive of the "Association Internationale contre la Cécité" is to be M. De Lapersonne (Paris) and that of the International Ophthalmological Council, M. van der Hoeve (Leyden).

At the session the report of MM. Lutrario and Jitta about trachoma was distributed by the Council of the League of Nations.

The League's object is (*a*) to further the co-operation of the various organisations for the prevention of trachoma; (*b*) to work with the international public health organisations; (*c*) to follow all measures concerning the anti-trachoma campaign, to second these measures and to spread them; (*d*) to organise conferences to establish the scientific bases of the anti-trachoma campaign, to elucidate problems of the aetiology, diagnosis, treatment, extension and prevention of this disease, as well as the scientific and social questions therewith connected, finally to prepare the necessary legislative measures.

Messrs. Addario (Palermo) and Mayou (London) submitted demonstrations. The programme was made complete by an evening-party of the delegates, a lunch given by Professor Gourfein at his Geneva clinic, and a dinner-party arranged by M. André Patry, a Geneva

oculist, at his French castle. Intercourse at the sittings between the delegates belonging to different nations went on in the most amicable manner. These friendly terms must be highly appreciated. Everything points to the Organisation becoming a prosperous undertaking. The countries which are obliged to prevent the disease from being introduced are indeed in the same need of a campaign against it as those where it is actually destroying eyesight. In Hungary the elements of this campaign were enacted as early as 1886 by a special law. The exertions of Japan in this respect are the object of general admiration. There are 1,000 trachoma consultation rooms, where half-a-million trachoma patients are being treated by 1,000 doctors at an annual cost of half-a-million yen.

The League of Nations has issued a special circular letter to the Governments requesting them to support the scheme.

ABSTRACTS

I.—RETINA

(1) **Vogt, A. (Zurich).—The healing of retinal detachment by means of ignipuncture of the retinal tear. (Zur Heilung der Netzhautablösung mittels Ignipunktur des Netzhautrisses.)** *Klin. Monatsbl. f. Augenheilk.*, Bd. LXXXII, S. 619, 1929.

(1) A considerable amount of interest is at present being excited with regard to the treatment of detachment of the retina by ignipuncture, and a detailed paper has been published by **Vogt** dealing with his experiences of the method and giving what he considers contra-indications for it and an account of his technique. A valuable contribution was made to ophthalmology by English surgeons that conservative treatment rarely held out any hope of success in the case of retinal detachment in which there was a hole. The obvious corollary that the closure of this hole might alter the prognosis in this type of case was at the time missed, and it is to the credit of Gonin that we are in a position now to hope that, provided the hole is obliterated, this type of detachment is amenable to cure. It must not be imagined that the method outlined below is invariably successful nor that the prognosis of this disease after treatment by ignipuncture can be considered good. But the published results of Gonin and the experiences of Vogt, as detailed in the present paper, would suggest that instead of the disease being practically hopeless, there is now a fair chance of accomplishing a cure for it.

The most favourable prognosis is attached to the so-called spontaneous detachment. With regard to the aetiology, Vogt believes that many of these result from an inflammation with the occurrence of cicatricial contraction in the vitreous. In these cases he adopts the suggestion originally made by Leber, that the detachment itself is due to an inflammatory pre-retinitis with the formation of a detaching membrane in the vitreous; this is responsible not only for the detachment but for the tear in the retina itself. He suggests that the more solid portions of the anterior parts of the vitreous which are closely adherent to the retina in the region of the ora serrata are responsible for many detachments with holes occurring in the anterior part of the retina. Blessig's vacuos which are observed in persons with myopia and in senility constitute another cause, since in this condition holes may form analogous to those present in cystic degeneration in the macula. In this case the detachment may occur as the result of degeneration without inflammatory processes. These detachments, whether due to this degenerative cause or an inflammatory cause are conditioned as a general rule by trauma, even although the latter itself may be very slight and incidental.

Cauterization in the treatment of detachment of the retina has been employed for over forty years, but the advance made by Gonin was to close the hole in the retina itself by cauterization after having located it with the ophthalmoscope, a technique which has never been employed before. Operation is useless unless the rupture has been found and unless it has itself been cauterized and thereby closed. The hole is often difficult to find and several examinations involving several hours of observation may be necessary before it is located. Examination by red-free light is sometimes valuable, since in this light the edge of the hole is contrasted more distinctly against the choroid. If the hole is near the region of the macula so that it cannot be reached by cautery, treatment is useless; and the treatment is rendered more difficult if the rupture is large or if its edges are ragged, or if multiple holes are present.

In the actual technique of operation, the first essential is to locate the hole with great accuracy. The meridian in which this lies is first marked by a suture stretching across the cornea from opposite points on the limbus, so as to avoid any error by rotating the globe when grasping it with fixation forceps. The actual point on this meridian is obtained by measuring ophthalmoscopically the distance of the hole from the disc and the macula or from the ora serrata in disc diameters. The site of the ora serrata is taken as 8 mm. behind the limbus, and adding the ophthalmoscopic measurement to this, the position of the

hole is found by measurement along the line of the suture which marks the meridian. This point is marked by a dye, and after the conjunctiva has been reflected as a flap, the sclera is pierced by a knife and then the cautery is introduced into the eye so that it reaches the hole in the retina. On withdrawing the cautery the conjunctival flap is put back into place, the eye tied up, and the patient put back to bed.

With the present experience which Vogt had had of this treatment many technical points still remain unsolved. The greatest drawback of the method is that only those detachments are favourable for treatment in which the hole is visible ophthalmoscopically and at the same time can be reached by cautery. There are other points which remain outstanding with regard to the size of the hole which it is reasonable to expect to close, the prognosis in the progressive development of multiple punctures and the precise method by which cauterization acts. The main result which has so far emerged is that 4 out of 8 patients operated on by Vogt have obtained good vision lasting so far over one year and a half; and although no undue optimism is expressed regarding the new method of treatment, it is hoped that when experience has been gained, more definite indications of treatment will be laid down.

W. S. DUKE-ELDER.

(2) **Vogt, A. (Zurich).—Further experience with ignipuncture of retinal holes in detachment of the retina. (Weitere Erfahrungen mit Ignipunktur des Netzhautloches bei Netzhautablösung.)** *Klin. Monatsbl. f. Augenheilk.*, Bd. LXXXIV. S. 305, 1930.

(2) In a subsequent paper **Vogt** reviews his experience thus. Of 11 cases submitted to operation in 5 the detachment was replaced, and in 6 the result was unsuccessful. Of the favourable cases, in one no hole could be seen, but only a suspicious thickening and after this area had been cauterized in 5 operations, improvement occurred. In a second with multiple tears two operations were necessary. In a third with cystoid retinal degeneration and two holes, the closure of one appeared to cause re-attachment. In the fourth two holes were successfully cauterized; and in the fifth, in which one eye was blind from a detachment complicated by cataract, a detachment in the other eye was replaced by operation after the patient had been kept in bed for several months without result. This last case particularly shows the value of the treatment. Seven cases were treated unsuccessfully. One of them had eleven holes in one eye which was unimproved after six ignipunctures, and in some of the others with multiple holes the treatment is still persisting. These results which, it will be noted, do not include favourable cases

only, give a percentage of cures of 40 to 50. It is noteworthy that only in two cases out of 25 examined could a hole not be found. The ultimate prognosis depends on the size and situation of the hole or holes, on their number, and on the willingness of the patient to submit to prolonged and tedious treatment.

Vogt finds that the hole is usually from 3 to 5 disc diameters from the ora serrata, and it is seen most easily by the indirect method of ophthalmoscopy. In difficult cases the anterior region of the retina should be searched under an anaesthetic by pushing the ciliary body inwards by pressure on the limbus. If the hole is far back it may be reached by a galvano-cautery which is bent into the shape of the eye-ball, with the point turned at right angles: this is insinuated round the globe under the protection of a suitably curved metal shield. Care must be taken that the cautery is not inserted too deeply into the eye or held in it for too long a time: this will result in the formation of vitreous opacities and even in necrosis of the surrounding retina which may cause a fresh hole. A loss of the vitreous is also to be avoided

With regard to the primary cause of detachment Vogt considers that the condition is invariably associated with a degeneration of the vitreous, and that the strands of the "scaffolding" of the vitreous body, being attached to the internal limiting membrane pull upon the retina, tearing it. The hole thus formed allows the fluid to gain access to the subretinal space, and is the immediate cause of the lesion.

W. S. DUKE-ELDER.

(3) **Junius, P. (Bonn).—The types and course of juvenile exudative retinitis at the macula. (Erscheinungsformen und Ablauf der juvenilen Retinitis exudativa macularis.)** *Zeitschr. f. Augenheilk.*, Vol. LXX, p. 129, 1930.

(3) In an important contribution, **Junius** brings forward arguments for the recognition of a new type of macular lesion. He describes four cases to illustrate the variety of appearances in which this disease may manifest itself. The essential features of the affection are that the lesion is purely retinal, and though it gives rise to severe visual disturbances during its active stage, it tends to subside leaving good vision and either none at all or but little permanent evidence in the fundus. The first case concerned a woman aged 34 years, who developed a large oedematous patch in the central area of one eye: it took ten weeks to evolve, and at its height it presented a sharply circumscribed macular lesion, 2·5 × 2·0 D. D. Haemorrhages were present, and visual disturbance was marked. The condition then regressed slowly, and at the end of six months, vision was fully restored and the retina showed no trace of any previous

affection. Now after 25 years there has been no recurrence and no eye trouble of any kind. The complete return to normal (" restlose Heilbarkeit ") is the characteristic feature of this case, in which the fundus appearances were not dissimilar to those described by the author and by Kuhnt in their well-known monograph on Disciform degeneration of the macula.

The second case presented a retinal lesion not unlike that seen in late stages of embolism of the central artery: oedema localized to the macular region, some exudation and pigmentary disturbance. This occurred in a patient aged 32 years. Within a month great improvement had taken place; haemorrhages previously seen had disappeared, and after another month the fundus was completely normal. Vision, which at first had been greatly affected, had now improved, but was not quite full. The patient is now a woman of 61 years; she has had no further trouble, and has good visual acuity.

A girl of 14 years is the third case. Here the lesion was bilateral and quite unlike that of the other two cases. The disc was oedematous and showed striation, but the characteristic features were a large circumpapillary area of exudate and merging on to it was a macular star. No general disturbance could be shown to exist; the kidneys in particular were not obviously affected; vision was greatly reduced. After six months the fundi were still unchanged, though vision had improved. At the end of a year, the star-shape disappeared leaving the macula slightly pigmented but the appearances at the disc had not changed much. Five years later the disc was normal, the macula rather pigmented, and the arteries near the disc carried a white sheath. On the whole the fundus was fairly normal, and vision was good. At the age of 21 years, this patient was found to have an aortic aneurysm, which ultimately caused her death, 19 years later. Syphilis, congenital or acquired, could not be established in this case. (A similar case, as far as the fundus appearances go, reported by Werner, is recalled by the author.)

The unity of these manifestations lies in the fact that the macular lesion tends to recover without permanent damage. The author sees a uniform pathology underlying these cases by recording a fourth case of a man of 27 years, the subject of migraine, who, following on an attack of migraine, lost the sight of an eye owing to central detachment of the retina. The author believes that some affection of terminal arterioles near the macula is the responsible factor. It is a transient affection, probably supervening on top of an unstable vaso-motor system. It may be a recurrent exciting cause, in which case it gives rise to the rare condition described by von Graefe, and authenticated

by Hirschberg and by Fuchs, as one of recurrent central retinitis. The tendency to restoration to normal must be ascribed to the state of the youthful end arterioles: vascular lesions near the macula leave permanent evidence in the aged. The relationship to Coats' disease is left an open question. Four plates with eight illustrations greatly add to the value of this paper.

ARNOLD SORSBY.

(4) **Terrien, F. and Renard (Paris).— Remarks on so-called albuminuric retinitis. (Remarques sur les Rétinites dites "azotémiques.")** *Arch. d'Ophtal.*, October, 1929.

(4) In an interesting paper, containing clinical records of four cases and three ophthalmoscopic drawings, **Terrien** and **Renard** discuss at length some of the undetermined problems of their subject.

Their conclusions are:—

The ophthalmoscopic changes in the retinitis accompanying Bright's disease, appear to result from the associated action of multiple factors, which evoke a profound systemic disturbance, manifesting itself most frequently by excess of blood pressure and alterations in the composition of the blood serum. These factors lead to vascular lesions in the eye, and, perhaps resulting from them, or perhaps occurring concomitantly with them, to exudation in the retina. Besides these special lesions others develop in other parts of the economy, particularly in the kidney. These in general are evolved along parallel lines to the ocular lesions, and in such cases the latter retain all their prognostic value. We then see the classical syndrome of albuminuric nephritis with retinitis.

Although in some instances the renal changes may be scarcely obvious, they exist nevertheless, and because there is always a possibility of a brisk aggravation of the nephritis it is essential to apply all possible means of examination.

Although a patient with "albuminuric retinitis" may be maintained in apparent good health for a longer or shorter period, he is always exposed to serious happenings, the occurrence of which is witness to the gravity of the prognosis afforded by the presence of retinal lesions. Such events may occur in cases apparently benign, and emphasize the necessity for thorough clinical investigation.

The authors quote from a recent paper by Prof. Ambard, who writes, . . . "of all the conditions found to be co-incident with albuminuric retinitis, excess of blood pressure is the most frequent and the most noticeable; this is followed by uraemia and finally by cholesterinaemia."

J. B. LAWFORD.

(5) **Arnold, Max (Zürich).—A further contribution to knowledge of cystoid degeneration of the macula (honeycomb macula), with remarks on the technique of red-free light. (Weitere Beiträge zur Kenntnis der cystoiden Maculadegeneration (Bienenwabenmacula) mit Bemerkungen zur Technik des rotfreien Lichtes.)** *Arch. f. Ophthal.*, Vol. CXXII, p. 299, 1929.

(5) **Arnold** here gives notes of a series of cases of cystoid degeneration of the macula, first described by his former teacher, Vogt, a condition in which the macula presents an appropriately named " honeycomb " appearance that is best brought out by examination with red-free light.

In this series eleven patients, who were mostly young individuals, were the subjects of a chronic irido-cyclitis—in two, indeed, this degeneration of the macula preceded the onset of the cyclitis.

This affection, which is well illustrated in the text, it is important to look for, as it offers an explanation of the marked fall in the central vision in cases of irido-cyclitis, where the changes in the cornea and vitreous are only slight.

He also gives examples of this condition in cases of retinal detachment due to inflammation of the choroid and retina, in which it is, according to the experience of the Zürich Clinic, a common phenomenon, especially in young persons.

In other cases quoted the aetiology was obscure. As regards the technique of red-free light, the author emphasizes the necessity of using the arc-lamp with direct current, in order to bring out the colour of the yellow macula with sufficient strength; the nitra lamp and common incandescent lamps are useless.

THOS. SNOWBALL.

(6) **Verhoeff, F. H. (Boston).—Retinoblastoma. Report of a case in a man aged 48 years.** *Arch. of Ophthal.*, December, 1929.

(6) **Verhoeff's** case is interesting because he believes it to be the only one of retinoblastoma (vel glioma retinae) known to have occurred in an adult. The patient was a man aged 48 years, who had noticed " spots like snowflakes " with the left eye, six months before admission. In spite of a posterior cortical cataract, the vitreous was seen to be full of fine opacities and a circumscribed detachment of the retina could be made out on the nasal side. The projection was irregular in contour and its surface showed prominent blood vessels. The eye was removed and section showed a grevish white tumour in the upper nasal quadrant extending from the root of the iris to a point 3 mm. from the optic disc. Histologically, the growth showed areas of

necrosis and was found to consist almost entirely of rosettes. It seemed to have originated from the pars plana ciliaris retinae and had invaded the ciliary body and choroid to an extensive degree.

F. A. W-N.

II.—NEUROLOGY

Ingvar, Sven (Lund, Sweden).—On the pathogenesis of the Argyll Robertson phenomenon. *Bulletin of the Johns Hopkins Hospital*, Vol. XLIII, p. 363, 1928.

Nielsen, J. M. and Verity, Ll. E. (Battle Creek, Michigan).—Argyll Robertson pupils in polyneuritis. *Ann. of Internal Med.*, Vol. III, p. 707, 1930.

In a valuable review of the multitude of conflicting theories on the nature of the Argyll Robertson pupil, **Ingvar** points out that the generally accepted assumption is that the syphilitic toxin has a special predilection for the pupillary pathways. As the phenomenon is practically always bilateral, it has been further assumed that it is the region of the central crossing of the pupillomotor fibres that is picked out. Yet such a predilection has never been recorded from the very extensive histological examinations made to reveal the anatomical basis of this reaction, so that its supporters have been driven to assume that the anatomical basis is ultra-microscopic. The fact remains that " the histo-pathological endeavours to reveal the nature of the Argyll Robertson pupil have all failed.

Ingvar's own view is based on extensive studies in anatomy, both human and comparative. He points out that for evolutionary reasons the pupillomotor pathways are lying very superficially on the diencephalon, like the other phylogenetically old pathways. It is known for certain that they take a surface route from the posterior part of the optic tract to the anterior commissure in front of the anterior quadrigeminal bodies. It is this superficial course which explains the Argyll Robertson phenomenon, for the metaluetic and luetic meningitic processes produce successively developing marginal degenerations of the optic pathways, as also of the diencephalic parts on the whole. The pupillomotor fibres must therefore be injured at an early stage, and all the characteristic features of the reaction find a ready explanation in this manner; " the reflex immobility of the pupil is to be considered simply as a meningitic symptom." The reaction is an indication of what is happening within the basal subarachnoid spaces along the optic pathways. The Argyll Robertson pupil seen in cases of head injury is also the

expression of meningeal disturbance. It is absent in the acute meningeal processes, for in these there is a rapid sequence of all kinds of complications, and there are no opportunities to study the pupillary symptoms in so pure a form as in the slowly progressing meningitic process, typical of syphilis. As all the evidence indicates that only such morbid processes as manifest themselves in producing marginal destructions within the basal subarachnoid spaces of the brain are able to cause the Argyll Robertson pupil, we understand that the metaluetic and luetic diseases hold a monopoly among the causes of this valuable symptom."

Nielsen and **Verity** report a case in which the Argyll Robertson reaction developed during an attack of polyneuritis. The view that the polyneuritis was an accidental complication in a syphilitic, was untenable, for in the first place there was no evidence of syphilis and secondly the pupils became normal whilst the patient was under observation. The patient also showed bilateral optic neuritis and considerably increased globulin in the spinal fluid. It was " therefore known without assumption that inflammation of the regions traversed by the afferent pupillomotor fibres was in progress. With the onset of this inflammation, Argyll Robertson pupils developed, with its subsidence they disappeared." The authors feel justified in concluding that the case corroborates entirely Ingvar's explanation of the pathogenesis of reflex immobility of the pupils.

ARNOLD SORSBY.

III.—MUSCLES

(1) **Gifford, S. R. (Chicago). — Muscle transplantation for paralytic strabismus.** *Arch. of Ophthal.*, December, 1929.

(1) **Gifford** reports four cases of successful muscle transplantation for paralytic strabismus. Two of these were cases of traumatic abducens palsy in which some degree of outward movement was obtained. The other two were cases of divergence following tenotomy of the internal rectus. In both of these, the eye remained straight after operation and regained some power of convergence. The technique is as follows:—

Complete tenotomy is first performed on the opposing lateral muscle through a small horizontal incision. The conjunctiva is then incised 3 mm. from the limbus from a little past the mid-line above, to a little past the mid-line below, exposing the insertions of the paretic lateral and of the two vertical muscles. The outer

thirds of the latter are detached from their insertions and attached to the insertion of the paretic muscle by mattress sutures passed from the deep surface so that the detached portions of the vertical recti slip under it. Both eyes are bandaged for seven days, and then covered with a shield which has a small hole for the other eye, so that no attempt to move the eye in the direction of action of the paralysed muscle shall be made for at least ten days.

F. A. W-N.

(2) **Berens, C. (New York).—The diagnosis and treatment of non-paralytic strabismus** *New York State Jl. of Med.*, June 1, 1929.

(2) In this paper **Berens** reviews the types of strabismus and gives a full account of the measures for treatment. The various forms of orthoptic treatment are described but little is given of the results of such treatment, though the earlier and fuller the treatment, the better is the prognosis for vision in the deviating eye. He considers that there is no one definite time for all cases when operation should be performed. The recession operation is advocated as giving the best results of any single operative procedure. An analysis of a series of cases where various forms of exercise of the eyes were given subsequent to operation, shows the value of the exercising treatment.

R. C. DAVENPORT.

BOOK NOTICE

XIII Concilium Ophthalmologicum. Amsterdam : Den Haag. September, 1929. Vols. I-IV. Amsterdam : van Rossen, 1930.

The Editorial Committee of the International Congress of Ophthalmology, held last year in Holland, are to be congratulated on the prompt appearance of the transactions, which contain the proceedings. Three volumes are bound, while the fourth comprises, *inter alia*, the world's ophthalmic register, a book which was badly needed, and which fills the gap admirably ; Greeff's *Katalog einer Bilderausstellung zur Geschichte der Brille*, and the catalogue of trade exhibits. This fourth volume is provided with a loose cover to match the others. The first and second volumes give the text of the papers read and the discussions which followed. These volumes are liberally illustrated. Volume III contains the reports of the set discussions.

The whole reflects the greatest credit on the management in Holland. We hope to notice the contents more at large in later issues.

OBITUARY

Theodor Axenfeld

THEODOR AXENFELD was born in June, 1867, in Smyrna, the son of Julius Axenfeld, a missionary. He was educated in Germany and studied medicine at the Univerisities of Marburg and Berlin. He took his M.D. degree in 1890. He studied ophthalmology under Prof. Schmidt-Rimpler and more especially Prof. Uhthoff.

He worked at pathology with Marchand and bacteriology with Rubner and C. Fraenkel. He spent the winter of 1894/95 in the laboratory of von Helmholtz.

During the years 1895/97 he was Privat-Dozent at the Universities of Marburg and Breslau and in 1897 he was called to the University of Rostock as Professor of Ophthalmology and Director of the University Eye Clinic. He remained in Rostock until 1901 when he accepted a call from the University of Freiburg and here he remained for the rest of his life, 29 years, in spite of many attempts of other universities to obtain his services, notably Berlin after the death of von Michel—Vienna after the retirement of Fuchs—Heidelburg after Leber, Breslau after Uhthoff, etc.

The chief reasons for his refusal of these calls were that at Freiburg he had an admirably designed and equipped ophthalmological institute and that being a small town he was not unduly worried by a large number of private patients. He always maintained the point of view that chiefs of clinics should keep themselves as free from private practice as possible in order that they should be able to devote themselves to scientific work.

It was to this aspect of ophthalmology that he gave most of his time and to which he made many notable contributions. His first important paper was "Suppurative Metastatic Ophthalmia," published in 1894. This paper is a model of what a completed investigation should be. It gives a detailed picture of the disease, the bacteriological findings, and the pathological changes, based upon experimental and clinical data, and remains to-day the classical paper on this subject. It was awarded the Graefe Prize by the Heidelburg (now German) Ophthalmological Society. This was followed in 1895 by the "Etiology of the Serpiginous Ulcer of the Cornea," in which he showed the important rôle played by the pneumococcus in the production of this condition. Then in 1896 came the discovery of epidemic pneumococcus conjunctivitis and diplo-bacillary conjunctivitis (simultaneously with Morax).

In 1902, based upon the enormous experience acquired in Rostock, he published "Das Trachom," an exposition of all the

various manifestations and complications of this plague and the best means of dealing with it, both individually and as a social question.

The humanitarian and philanthropic aspect of the man was shown first in 1905 when he used as his subject for a Rectoral address " Blindness and Care of the Blind." In this subject he showed a continuous interest and always used his great influence to bring about an amelioration of the conditions of life for the blind in all social levels.

From 1901 onwards he became interested in tuberculosis of the eye and many articles on this subject came from his laboratory and in 1909 the description of the condition " Periphlebitis retinae tuberculosa." In 1907 appeared the book " Ophthalmological Bacteriology," which was translated into English in 1908 by MacNab. In 1908 he published in the French language his work " Le catarrhe printanier."

In 1909 appeared the " Textbook of Ophthalmology " which went through many editions, the last one, the seventh, in 1923. This book has been translated into many languages.

The number of papers and books published under his own name amounts to nearly 200 and besides this there are a larger number which, emanating from his clinic and laboratory, owe their inspiration to him, but bear the names of those who worked under him.

In 1899 he became associated with Zehender in the editorship of the " Klinische Monatsblätter für Augenheilkunde." In the following year Zehender retired and this important publication has been carried on by Axenfeld alone from that time. Under his editorship it became the most widely read German ophthalmological periodical and was characterized by the importance of its original contributions, by the general excellence of its editing and by a sane appreciation of all the problems of ophthalmology.

In 1915 he assumed jointly with Elschnig the editorship of the big Graefe-Saemisch " Handbuch der Augenheilkunde " and in that year appeared the first edition of the "Operationslehre " to be followed in 1922 by a second edition. In 1898-1928 appeared the volumes " Pathology of the Eye " as part of the " Ergebnissen " of Lubarsch and Ostertag.

Axenfeld was the recipient of many honours, both in his own and foreign countries. Besides many ribbons and stars of knightly orders, the University of Freiburg made him first Dean of Faculty of Medicine and later, Rector of the University.

In 1925 he became President of the German Ophthalmological Society and he was German representative on the League of Red Cross Societies for the Prevention of Blindness. He was an honorary member of many foreign medical societies and in

1929 was awarded the Lucien Howe gold medal of the American Ophthalmological Society for his "Great services to Ophthalmology." He had previously received the Graefe Medal of the German Ophthalmological Society.

In 1928, he and Wessely represented Germany at the meeting of delegates which arranged the 1929 International Congress at Amsterdam, and those who met him at that congress will remember how active he was, how interested in everything and how much he devoted himself to making that congress the success it was.

He had intended being present at the Jubilee Meeting of the Ophthalmological Society of the United Kingdom this year but was unable to do so as he had accepted an invitation to visit the Universities of Japan. From this visit he returned in the middle of May and resumed his work, but it was only to be for a short time. An illness supervened and he died on July 29 in his 64th year.

Axenfeld's great characteristics were a deeply religious feeling, honesty of purpose, uprightness of character and an extraordinary power of concentration and work. This was combined with great intellectual ability and a critical faculty which led him to be an indefatigable searcher after the truth. As a teacher he was unexcelled and to all those who had the privilege of working with him he was a constant source of inspiration—his example stimulated all so that they gave of their best for him.

His death while still in possession of his full mental vigour is an irreparable loss to ophthalmology and he will be mourned by a great circle of pupils and friends all over the world.

He leaves behind a wife, three daughters and one son and to them we would express our deepest sympathy.

Arthur Robertson Brailey

WE regret to record the death of A. R. Brailey in tragic circumstances when the yacht "Islander" was lost with all hands off the Cornish coast in a gale on August 21. The younger son of Dr. W. A. Brailey, Ophthalmic Surgeon to Guy's Hospital, whom he much resembled in face and figure, Brailey was born in October, 1877. Educated at Westminster, he gained a scholarship at Downing College, Cambridge, and completed his medical course at Guy's Hospital, where he gained a University entrance scholarship. He also spent some time in Vienna. Qualifying at "the Colleges" in 1903, he took the M.B., M.C., Cantab. in 1904, having in the previous year obtained his M.A., B.Ch. His F.R.C.S. dated from

1904. He was House Surgeon and Ophthalmic House Surgeon at Guy's Hospital and later Clinical Assistant in the Ophthalmic Department; and he succeeded to his father's practice. Early in the Great War Brailey served in the R.N.V.R., and later became Consulting Ophthalmic Surgeon to the R.A.F. He was Hon. Surgeon to the King and Surgeon-Captain R.N.V.R., in which he held the post of Senior M.O., London Division, the headquarters of which are in H.M.S. President.

Brailey contributed papers to the *Transactions of the Ophthalmological Society* on "Congenital Distichiasis" and on "Cysts of the Pars Ciliaris Retinae" in 1906, 1907; and he was one of the three openers in 1919 in the discussion on the "Visual Requirements of Aviators," when he gave a most practical exposition of his subject. He retired a few years ago and lived at The Clock House, Dunmow, Essex.

The cause of the catastrophe will in all probability never be known and in expressing the sympathy of the Ophthalmic fraternity with the members of his family we may appropriately echo the lines in Spencer's "Faerie Queene":—

> "Sleepe after toyle, port after stormie seas,
> Ease after warre, death after life, does greatly please."

NOTES

French Course in Ophthalmic Surgery.

WE are asked to announce that a very comprehensive course in ophthalmic surgery will be given in Paris in the month of October under the supervision of Professor Terrien, assisted by MM. Regault, Velter, Casteran, Favory, Veil, Renard and Jean Blum. This will begin on October 10 and will consist of twelve lectures at the Hôtel-Dieu, with practical work in the laboratory and instruction in operative surgery, diathermy and X-rays. The fee for the course has been fixed at 300 francs. Further information can be obtained from Professor F. Terrien, at the Hôtel-Dieu.

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Honour.

AT a recent meeting of the American Medical Association in Detroit, the Ophthalmic Research Medal was awarded to Dr. Frederick H. Verhoeff, of Boston.

Early Provision for Blind Persons.

NOT long ago we gave a short note of a grant by the Conqueror, recorded in "Domesday," to a blind person in Worksop. In the third volume of "Lincoln Wills," edited by Canon C. W. Foster (*Lincoln Record Society*, Vol. XXIV), occur the following testamentary provisions. Thomas Winterton, of Burgh-le-Marsh, in his will gives, "to the blynde wenche that is with Robert Rutter, V yerdes blankyt, 2, April, 1531."

Thomas North, Parson of Brinkhill, 29, Aug., 1531, among other bequests left "all my small tubbys to be divided." Among the recipients was William Teweyll, being blynde.

FUTURE ARRANGEMENTS

1930

October 7.—Midland Ophthalmological Society, at Birmingham.
October 10.—Ophthalmological Section, Royal Society of Medicine.
November 14.—Ophthalmological Section, Royal Society of Medicine.
December 2.—Midland Ophthalmological Society, at Birmingham.
December 2.—Ophthalmological Section, Royal Society of Medicine (Clinical Meeting).

CONTEMPORARY OPHTHALMIC LITERATURE

American Journal of Ophthalmology *August, 1930.*

BRUNER. Telescopic lenses as an aid to poor vision.
DORRANCE. Operative treatment of pulsating exophthalmos.
BEIGELMAN. Simple tarsectomy: its indications and technique.
WILDER. Some phases of secondary glaucoma.
BARLOW. Ephedrine and glaucoma.
FERREE, RAND and WENTWORTH. The influence of brightness of surrounding field or background on the size and shape of the blind spot for color.
GOLDENBURG. Phlyctenulosis and its relation to tuberculosis.
JACKSON. William Henry Carmalt.
LEWIS. Giuseppe Cirincione.

Bulletin de la Société Belge d'Ophtalmologie.

BADOT. The ocular lesions (industrial injuries) in glass workers.
KLEEFELD. Sulphuric acid burn treated by irradiated ergosterine in oily solution.
KLEEFELD. Three cases of exudative retinitis in young subjects.
BICHELONNE. Astigmatism in oblique vision through spherical correcting lenses.

WEEKERS and HUBIN. The importance of stereoscopic acuity in clinical work.
RUBBRECHT. Retinal detachment.
HÉRBERT. A peculiar case of ophthalmic migraine.
VAN LINT. Plan for creating a course of ophthalmology (special doctorate).
COPPEZ, M. L. Trachoma and surgical diathermy
FRITZ. Attempt to determine experimentally the progression to be given to the grading of visual acuity.
VAN CANNEYT. Comparative study of the complement fixation reaction and the Kahn test on the aqueous humour and the blood of syphilitic rabbits.

Annales d'Oculistique. *July, 1930.*

MORAX and DEPOUILLY. Cavernous angioma of the choroid.
AUBINEAU. Pseudo glaucoma
SHOJI and KOKAWA. A variety of haemoglobinophile bacillus producing corneal ulceration in man.
DOLLFUS. A case of haemosporic abscess of the choroid.
DEHOGUES. Glaucoma and facial naevus.
ABRAMOWICZ. The introduction of air into the anterior chamber during the operation for cataract.
RIFAT. Cataract and pernicious anaemia.

Archives d'Ophtalmologie. *July, 1930.*

DUVERGER and VELTER. Reflections on biomicroscopy of the lens.
COPPEZ, H. To what specifications should the grades of visual acuity correspond?
TERRIEN, SAINTON and WEIL. Progressive exophthalmos from a neoplasm in the frontal lobe.
MAJEWSKI. Attempt at diascleral repair of ophthalmoscopic lesions.
TRANTAS. The trachomatous ocelli of Bonnet and the paralimbic corneal follicles of trachomatous pannus.
PESME. Two cases of detachment of the retina in new born children.
FRITZ. Measurement of the rigidity of the central artery of the retina and its clinical importance.

August, 1930.

TEULIÈRES and BEAUVIEUX, The angle of the anterior chamber; its rôle in ocular hydrostatics.
VILLARD. Catamenial episcleritis.
FAGE. The rôle of injury in certain forms of iritis.
CUÉNOD and NATAF. Tarsal biomicroscopy in certain cases of conjunctivitis.
BORDIER. Concerning the "moire" effect. "Moire" by transmitted light and by reflection.

Zeitschrift für Augenheilkunde. *August, 1930.*

SAFAR. On affections of the eye (opacity of the lens, retinitis and hypopyon iritis as late results) produced as a pure electro-dynamic effect of a lightning flash.
REITSCH. On the appearance of the globe in the palpebral aperture.
WALDMANN. Clinical observations on the meaning of nasal disease in the occurrence of iritis with a note on the sympathising character of spontaneous serous iritis.
SÜCHTING. On a case of intra-uterine gonorrhoeal ophthalmia in a newborn child with bilateral corneal affection.
NIKYUZI TOGANO. On three family trees of blue sclerotics.
Report of the 48th meeting of the German Ophthalmological Society at Heidelberg. June, 1930.

Annali di Ottalmologia e Clinica Oculistica. *April, 1930.*

CIRINCIONE. Precision in the treatment of eye diseases.
OVIO. Communications made at the International Congress at Amsterdam in September, 1929. Examination of the light sense. (Part I.)
DEL DUCA. Cylindroma of the orbit.
—— Examination of the contents of an orbit exenterated for retrobulbar sarcoma.
PANICO. Pigmented cells in the sclerotic of the vertebrates.
BARLETTA. On two cases of homonymous hemianopia and of quadrantic anopsia of cortical origin.
CASO. Contribution to ultra-violet light therapy.

Archivio di Ottalmologia. *May, 1930.*

ALAJMO. The present state of the modern physico-chemical doc rine of glaucoma.
DI FEDE. Observations on the colour sense in ants.
Report of the 43rd Congress of the French Society of Ophthalmology.

Bollettino d'Oculistica. *July, 1930.*

DE LOGU. The corneal curve in ametropia.
GUALDI. Hereditary and familial anomaly of configuration of the nose and its connection with affections of the lacrimal passages.
FONTANA. Isolated paralysis of both third nerves in fracture of the base of the skull.
MARUCA. On a case of typical bilateral retinitis circinata.
BELLAVIA. On a case of Graefe's symptom associated with blepharospasm.

Lettura Oftalmologica. *December, 1929.*

VITA. On neuroparalytic keratitis following alcohol injection into the Gasserian ganglion.
MARINOSCI. Interference with the course of frequency during treatment of hypertrophic processes of the conjunctiva.

January, 1930.

LOGU. An uncommon observation on a large cystic tumour of the lower conjunctival fornix.
RIZZO. Statistics of ocular injuries following observations in the years 1924-28.
MAZZEI. The injection of copper in the cure of trachoma.

February, 1930.

BUSSOLA. Pathological and clinical considerations of so-called serous-iritis.
MARINOSCI. Rare binocular tuberculous manifestations.
ADINOLFI. The anatomical cause of dacryo-cystitis.

March, 1930.

MAZZOLA. On the pathogenesis of zonular cataract.
LA FERLA and CARBONARO. On a case of primary post-traumatic tuberculosis of the conjunctiva.
ADINOLFI. Choroido-retinitis of nasal origin.
TESSIER. Bilateral congenital displacement of the lens.

April, 1930.

SANTONASTASO. The fight against trachoma in the city of Bari in the first five years of the ophthalmic clinic.
LODDINI. On the specificity of the citoryctes of Guarnieri.

May, 1930.

GUALDI. The reaction of the pupil in convergence.
DENTI. Aspergillus kerato-mycosis.
NEUSCHUELER. On black cataract.
BONFIGILO. Thiersch grafts of the lids.
CALENDOLI. Note on the military literature of glaucoma.

June, 1930.

TESSIER. Concretions in the inferior lacrimal canaliculus.
——— The intra-ocular tension during accommodation and convergence in glaucoma and in detachment of the retina.
DUC. Clinical discussion of endobulbar foreign bodies.
TESSIER. Delayed healing of the corneal limbus after extraction of cataract

July, 1930.

TESSIER. The value of the intra-ocular tension in the normal eye in various positions of the head.
TESSIER. Paralysis of accommodation as a sequela of masked diphtheria of the fauces. Its importance in retrospective diagnosis.
MOTOLESE. Vaccinial ulcer of the lid with corneal complications.

Rivista Oto-Neuro-Oftalmologica. *May-June, 1930.*

BORGHESAN. Cranio-pharyngeal tumour with bilateral paralysis of cranial nerves.
MELANOWSKI. On scarlatinal orbital phlegmon.
DE ANGELIS. The symptomatology of tumours of the occipital lobe.

Archivos de Oftalmologia Hispano-Americanos. *August, 1930.*

VERDAGUER. Some considerations on ocular rosacea.
CASTRESANA. Radiography of the lacrimal sac.
ARRUGA. Relations between ophthalmology and odontology.

Boletín de Información Oftalmológica. *September-October, 1929.*

ONETO. Symmetrical lymphoma of the eyelids and the orbit.
SORIANO. Present day conceptions of ocular tuberculosis.

Revista Oto-Neuro-Oftalmologica y de Cirugia Neurologica.

July, 1930.

GÓMEZ. Radiographic diagnosis of affections of the nervous system.
FONSECA. Parathyroid function in the syndrome of blue sclerotics.
PAVÍA. Shadows on the retina from floating vitreous opacities.
SABBADINI. Relapsing serous meningitis and its ocular signs.
OJEA. Synthesis.

Revista Cubana de Oftalmologia y Oto-Rino-Laryngologia.

VÉLEZ. Trachoma in Latin America.
RUBIO. Advantages of early application of atropine in the combined extraction of cataract.
MÁRQUEZ. Lens antigen therapy in cataract.

Annaes de Oculistica do Rio de Janeiro. *June, 1930.*

MONTEIRO, GALLOTTI and A. FILHO. Jacksonian epilepsy following an injury.
CAMPOS and DA SILVA FILHO. Palpebro-conjunctival blastomycosis.
BELFORT. On a case of tumour of the optic nerve with intracranial spread.
JUNIOR. Melanotic sarcoma of the choroid.
FIALHO FILHO. Vitiligo and sympathetic ophthalmitis.